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C. A. L.
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FILE

Venkataramani (K. S.) & Venkata Ram (C. S.). **Rhizoctonia solani inciting a collar rot of Tea.**—*Phytopathology*, **49**, 8, p. 527, 1 fig., 1959.

From the UPASI Tea exp. Sta., Devarshola, S. India, is reported an instance of considerable damage in a field of young tea, 8 months after planting out, by *R.* [*Corticium*] *solani*, hitherto generally confined to nursery seedlings or young shoots and leaves in the field [cf. **8**, 470]. Injury at the collar ranged from bark splitting and discoloration to complete girdling of the stem and heavy callusing. The attack was attributed to too deep planting (below nursery level) and injury to the bark during mulching.

Ross (A. F.). **Local immunity induced by Tobacco mosaic virus in hypersensitive Tobacco and its modification by Potato virus X.**—Abs. in *Phytopathology*, **49**, 9, p. 549, 1959.

The immune zone around a lesion induced by tobacco mosaic virus (TMV) in leaves of a hypersensitive var. (Holmes' NN) of tobacco increases, as the lesion develops, to a max. of 2–3 mm. beyond the lesion in 6–8 days, when lesion enlargement stops, presumably due to development of immunity in advance of the virus. Lesions do not develop in the zone after re-inoculation with TMV, but may do so after inoculation with tobacco necrosis, tobacco ring spot, or tomato ringspot viruses. In leaves also infected by potato virus X (PVX) local immunity from TMV does not develop; cell to cell spread continues indefinitely, with new lesions forming near old ones after re-inoculation with TMV. The effect of PVX is greatest with simultaneous inoculation, intermediate when PVX inoculation precedes TMV by 7 days, and least when leaves systemically invaded by PVX are inoculated with TMV. When PVX follows TMV by 3–6 days some lesions are not affected and others enlarge asymmetrically.

Stouffer (R. F.) & Ross (A. F.). **The effect of temperature on the interaction of Potato viruses X and Y in Tobacco.**—Abs. in *Phytopathology*, **49**, 9, p. 551, 1959.

Young Turkish tobacco plants inoculated either with a mild str. of potato virus X (PVX) alone or + virus Y (PVY) were held at 19, 28, or 32° C. under 400–600 ft.-c. light for 17 hr. daily. The 1st uninoculated leaves invaded during systemic movement (acute-stage leaves) were assayed on *Gomphrena globosa*. With PVX, alone or in combination, conc. in these leaves was highest at 19°, lowest at 32°, though differences due to temp. were less for double infection. The ratio of the conc. of PVX in doubly infected leaves to that in singly infected was 2:3 at 19°, 5:6 at 28°, and 10:15 at 32°. PVY conc. at 32° did not differ significantly from that at 28°.

Maine (E. C.), Tove (S. B.), & Kelman (A.). **Pathological alterations in respiration of Tobacco stem tissue affected by Pseudomonas solanacearum.**—Abs. in *Phytopathology*, **49**, 9, p. 545, 1959.

Following infection by *P. solanacearum* [**38**, 279] respiration increased in both resistant and susceptible tobacco stem tissue. Near the point of inoculation O uptake increased after 48 hr. Respiration also increased within 2 hr. of vacuum infiltrating healthy stem tissue disks with suspensions of washed bacteria. These effects could only partly be attributable to O uptake by the pathogen. DNP [2,4-dinitrophenol] (10^{-3} M) and *o*-phenanthroline inhibited O uptake markedly

in healthy but only slightly in diseased tobacco tissue. Malonic acid inhibited respiration equally in both, but initial inhibition by fluoride was overcome in the later stages of disease development. It is indicated that there is an altered respiratory pathway in diseased tissue.

Sinclair (J. B.). **Reduction of Tobacco mosaic virus on Tomato seed by fermentation.**—Abs. in *Phytopathology*, **49**, 9, p. 551, 1959.

Seed from tomato fruits on plants that had been either inoculated with tobacco mosaic virus (TMV) or not was either washed and dried immediately or first fermented for 10 days. When the seed was assayed on *Nicotiana glutinosa* (3 times in 10 months) there was a highly significant reduction of virus in the fermented compared with the other lot. Where TMV was low in the unfermented seed, it was absent altogether from the fermented portion of the same lot.

Newhook (F. J.). **Overlooked sources of diseases in Tomato houses.**—*N.Z. Comm. Gr.*, **13**, 12, pp. 1, 7, 1958.

It was demonstrated by the Plant Diseases Division, Auckland, that support wires in tomato greenhouses can be a source of infection to tomatoes from tobacco mosaic virus [**30**, 590], by rubbing the wires with wet fingers and then rubbing the leaves of tomato plants. The wires should be thoroughly washed with soapy water and also wetted with 1:50 formalin solution when this is being used for soil sterilization.

Murakishi (H. H.). **Varietal response to factors influencing the expression of Tomato internal browning symptoms.**—Abs. in *Phytopathology*, **49**, 9, p. 546, 1959.

This was compared in the greenhouse on 4 vars. exposed to low and high light, with and without Boyle's str. of tobacco mosaic virus (TMV) [**38**, 487]. In low light without TMV, Homestead had 26% internal browning (IB) at 1st harvest; with TMV it was doubled. Under high light TMV induced 48% IB compared with 4% for uninoculated plants. In Fireball with no TMV there was 10% IB with high light and 0% with low; with TMV it was 37 and 26%. Indian River and Holmes' P.I. 23567 remained free from IB throughout. All inoculated plants were systemically infected; IB was the same whether induced by low light or TMV.

Dvoretskaya (Mme E. I.), Pŷrina (Mme I. G.), & Feoktistova (Mme O. I.). К вопросу о физиологической природе устойчивости растений Томатов к заболеванию бурой пятнистостью. [Concerning the physiological nature of the resistance of Tomato plants to leaf mould infection.]—Биохим. Плод. Овощ. [*Biokhim. Plod. Ovoshch.*], *1959*, 5, pp. 165–194, 3 fig., 1959. [45 ref.]

Observations at the Moscow State Univ. and the T.A. Timiryazev agric. Acad., indicated that *Lycopersicon pimpinellifolium*, highly resistant to *Cladosporium fulvum* [cf. **38**, 292], is characterized by high respiratory intensity and low polyphenoloxydase activity in comparison with susceptible vars.; peroxidase activity is low. Toxins from the fungus cause wilting of the leaves in both resistant and susceptible tomato plants, though in the latter toxic action is stronger. When infection occurs on a susceptible var. there is a reduction in chlorophyll *a* and *b* and protochlorophyll; stomata lose their ability to function normally, remaining open even at night, and resistance of the stomata to high temp. is lowered; respiratory intensity increases and polyphenoloxidase activity is reduced. Infiltration of the toxin into the leaves of *L. pimpinellifolium* raised polyphenoloxidase activity, while in susceptible vars. there was a sharp decrease. The formation of necroses in the leaves of resistant vars. on inoculation suggests that there are reactions to penetration.

Edgington (L. V.) & Dimond (A. E.). **Correlation between wilt resistance of plants and the nature of their pectic substances.**—Abs. in *Phytopathology*, **49**, 9, p. 538, 1959.

Resistance of tomatoes to [unspecified] wilt pathogens is increased by treatment with naphthalene acetic acid (NAA) [**38**, 544] and decreased by induced Ca deficiency, probably owing to a change in the pectic substances in the plant. Alcohol-insoluble pectic substances were extracted from plants treated as above and the ease and extent of enzymatic hydrolysis compared, using pectinol 100 D; the end products released were precipitated with alcohol and determined colorimetrically. Pectic substances from Ca-deficient plants were more readily hydrolysed than those from normal plants, those from NAA-treated plants less so. Resistance to wilt pathogens secreting pectin enzymes is therefore correlated with resistance of the contained pectic substances to enzymatic hydrolysis.

Roth (E. R.), Hepting (G. H.), & Toole (E. R.). **Sapstreak disease of Sugar Maple and Yellow Poplar in North Carolina.**—Abs. in *Phytopathology*, **49**, 9, p. 549, 1959.

The sapstreak disease (*Ceratocystis coerulescens*) [**38**, 61], already reported as killing sugar maple (*Acer saccharum*) in N. Carol., has also been found occasionally to kill *Liriodendron* [*tulipifera*] in N. Carol. and Tenn. Symptoms, a rapid thinning of foliage and grey stained sapwood, are striking on both but the disease is confined to restricted areas. Inoculations of 152 *A. saccharum* and 120 *L. tulipifera* resulted in the death of only 14 and 4%, respectively, in 9 yr. Isolates of the pathogen from the 2 spp. and from sapstain of hardwood lumber all produced disease in 1 or more trees.

Vlasov (A. A.) & Krangauz (R. A.). Болезни Белой Акации, Дуба и Тополя в насаждениях Ачикулакского лесхоза. [Diseases of White Acacia, Oak, and Poplar in the Achikulak State forestry plantations.]—Сборн. Раб. лесн. Хоз. [*Sborn. Rab. lesn. Khoz.*], *1958*, 35, pp. 239–254, 5 fig., 1958. [Received Nov. 1959.]

This is a final report of investigations [cf. **37**, 422] started in 1952 in the extensive Achikulak plantations. Necrosis of the bark and branches is the most widespread disease, which on white acacia [*Robinia pseudacacia*] is caused by *Diaporthe fasciculata* (only the *Phomopsis* state) [**38**, 424] and occasionally by *Pseudovalsa profusa* [loc. cit.] and *Cucurbitaria* sp. *Phomopsis quercella* has been isolated from oak bark necrosis, and it is suggested that the acacia grown near oak may be the source of this infection. It was established that often *Cucurbitaria* infection occurs before invasion by *D. fasciculata*.

Under oak trees with extensive necrosis were fructifications of the mycorrhiza-forming *Scleroderma verrucosum*. *Diatrype stigma*, *Nummularia bulliardii*, and *Vuilleminia comedens* were also isolated from trunk and branch necrosis. *D. stigma* in its imperfect state (*Naemospora croceola*) causes necrosis of the crown and branches, producing a brick-red colour. It is widespread only in dry warm climates.

The most dangerous and damaging infection on poplar is an extensive black necrosis with very strong odour, caused by *Cytospora foetida* [**37**, 422], infection by which is spreading rapidly and has been noted in the Stalingrad, Stavropol', and Rostov regions. Infection occurs on the crown or just below and it can affect trees of all ages. The fungus is transmitted by insects. From thinner necrotic branches *C. szembelii* [loc. cit.] was isolated, but the damage caused by the latter is negligible compared with the catastrophic damage by *C. foetida*.

Whitten (R. R.) & Swingle (R. U.). **The Dutch Elm disease and its control.**—*Agric. Inform. Bull.* 193, iii+12 pp., 6 fig., 1 map, 1958. [Received Oct. 1959.]

This publication by the U.S. Dept Agric., superseding earlier leaflets, deals with

general aspects of the disease caused by *Ceratocystis ulmi* [**38**, 166 *et passim*], its spread, and control.

Toole (E. R.) & Morris (R. C.). **Trunk lesion of Sweetgum.**—*Plant Dis. Reptr*, **43**, 8, pp. 942–945, 3 fig., 1959.

These lesions on *Liquidambar styraciflua*, described from the Southern Forest Exp. Sta., start with an ooze of gum from a crack, subsequent callus formation producing pronounced ridges. The phloem is killed in patches, sometimes down to the cambium, and small, discoloured lines appear in the wood. The disease has been found in bottom-land stands usually 10–20 yr. old in Texas, La, Miss., Ala, and Fla. Of several fungi isolated, a non-sporulating one (no. 3), as yet unidentified, has induced lesion formation after wound inoculation.

Démétriadès (S. D.) & Holevas (D.). **La carence de magnésium chez le Mûrier.** [Magnesium deficiency in the Mulberry.]—*Ann. Inst. phytopath. Benaki*, N.S., **1**, 6, pp. 330–331, 2 pl., 1958. [12 ref.]

Chlorosis, observed on the leaves in several areas, 1st appeared on leaf margins and progressed towards the centre between the veins, the green areas receding to the leaf base, sometimes asymmetrically. Use of nutrient solutions confirmed that Mg deficiency was the cause.

Neely (D.). **A Tupelo canker caused by Botryosphaeria ribis.**—Abs. in *Phytopathology*, **49**, 9, p. 547, 1959.

Cankers form on twigs and larger branches of *Nyssa sylvatica* and infected stems are frequently girdled and may die. The *Dothiorella* state occurs in 1st-yr. lesions, both states on older cankers.

Bilbruck (J. D.). **Toxicity of Oak heartwood and Oak heartwood water extracts to the Oak wilt fungus.**—*Plant Dis. Reptr*, **43**, 8, pp. 936–941, 1 fig., 1959.

This information about *Ceratocystis fagacearum* has been noticed [**38**, 230].

Krangauz (R. A.). Новое заболевание сеянцев Дуба на юго-востоке европейской части СССР. [New disease of Oak seedlings in the south-eastern European part of U.S.S.R.]—Сборн. Раб. лесн. Хоз. [*Sborn. Rab. lesn. Khoz.*], *1958*, 35, pp. 258–260, 1958. [Received Nov. 1959.]

In recent years reports have come from Moldavia and the S.E. U.S.S.R. of a mass loss of oak seedlings by *Verticillium dahliae* [cf. **38**, 339]. In 1955 it was found that the same disease was spreading rapidly in the Rostov region. Infection begins in the hypocotyl and spreads up and down. The wood of the infected plants becomes dark. This is the 1st report of the pathogen on oak in U.S.S.R. Oak nurseries should be established in fields previously sown with cereals, acorns dusted with granosan [**38**, 630], and infected plants uprooted.

Zakharova (Mme V. N.). Важнейшие вредители и болезни Бархата амурского и меры борьбы с ними в питомниках и культурах. [The most important pests and diseases of the Amur Cork tree and control measures in nurseries and plantations.]—Сборн. Раб. лесн. Хоз. [*Sborn. Rab. lesn. Khoz.*], *1958*, 35, pp. 266–268, 1958. [Received Nov. 1959.]

In the Amur region, U.S.S.R., cork tree [*Phellodendron amurense*] plantations were extensively infected by rust (*Coleosporium phellodendri*) on young leaves in July. In Aug. the leaves become yellowish, then brown, and fall earlier than from healthy trees. The disease reaches epiphytotic proportions in wet years, and then attacks old trees, as in 1952 in the Khekhtsir forests with trees 70–90 yr. old. Severely infected trees were killed during the winter, and those which survived did not

develop leaves in spring and slowly died. Control measures must begin at the end of May with 3–4 dustings (at 2-week intervals) with flowers of S or with finely pulverized S (15–20 kg./ha., later 23–27 kg./ha.). If S is not available 0·5% Bordeaux mixture may be used.

Boyce (J. S.) & Bakshi (B. K.). **Dying of Sal.**—*Indian For.*, **85**, 10, pp. 585–588, 2 fig., 1959.

The dying of *Shorea robusta* [**36**, 433] which occurs in many localities throughout its range in India, particularly on poor sites, is probably caused by deterioration of site conditions and decrease in soil moisture. *Hypoxylon mediterraneum*, associated constantly with this condition and believed to be pathogenic following loss of vigour, hastens the death of trees or prevents their recovery.

Bakshi (B. K.) & Boyce (U. S.). **Water blister in Teak.**—*Indian For.*, **85**, 10, pp. 589–591, 4 fig., 1959.

This condition, noticed in certain plantations along rivers in Nilambur, Kerala State, is characterized by exudation from the stem near ground level of copious yellow sap which leaves a blackish discoloration on drying. The cause is physiological; when the trees are leafless, with high temp. and abundant soil moisture, increasing root pressure forces sap collected in crevices, which are common in the wood, to ooze out through the thin bark. The damaged trees (the disease does not cause death) may be removed during improvement felling and thinning. It is advisable not to plant teak in moist areas where the condition is likely to develop.

Berry (F. H.). **Walnut anthracnose—its cause and control.**—*Rep. Nth. Nut Gr. Ass.* 48, pp. 16–23, 4 fig., [? 1958].

In this paper, read at the annual meeting, Aug. 1957, it is stated that the rapid build up and spread of walnut anthracnose (*Gnomonia leptostyla*) [**32**, 649] at Beltsville, Md, particularly common on the eastern black walnut, on which it causes almost complete defoliation by late July or early Aug., is favoured by moderate rainfall and low temp., opt. for spore maturation and discharge. On trees treated with dithane Z-78, the most effective fungicide against anthracnose, there was 21% leaf infection, on untreated 97% (14 and 53% defoliation, respectively). Four applications of dithane Z78 or low-lime Bordeaux mixture gave good control even under conditions favourable for disease development.

Margus (M.). **Lehisekultuuridest ja nende tervislikust seisundist Eesti NSV-s.** [On the Larch plantations and their state of health in the Estonian S.S.R.]—*Eesti NSV teadus, Akad. Toimet.*, Ser. biol., **8**, 3, pp. 204–215, 1959. [Russ., Germ. summ.]

From the Inst. Zool. Bot., Estonian Acad. Sci., large-scale infection of pure larch plantations (under 10-yr.-old) in 1958 by *Dasyscypha* [*Trichoscyphella*] *willkommii* [cf. **38**, 104] and possibly other fungi is reported. The infection was especially noticeable in depressions, hollows, and damp places. The largest focus of infection was in 1958 in the Pilkuse circuit of the Otepää section, where in larch plantations in the 8th growth yr. (10-yr.-old trees) 40% had survived, of which 30% were infected by *T. willkommii*. In contrast to *Larix decidua* and *L. sukaczevii*, *L. leptolepis* and *L. kurilensis* are resistant.

Vorob'eva (Mme Y. V.). Загнивание и увядание всходов Кедра сибирского. [Rotting and withering of Siberian Cedar seedlings.]—Сборн. Раб. лесн. Хоз. [*Sborn. Rab. lesn. Khoz.*], *1958*, 35, pp. 255–257, 1958. [Received Nov. 1959.]

In nurseries in the Moscow region Siberian cedar [*Pinus cembra* var. *sibirica*] sown in 1955 developed infection which caused 80–100% loss of seedlings in the middle

of Aug. *Rhizoctonia* sp. and *Fusarium* sp. attacked the seeds during germination. There were 2 types of infection, one at the base of the shoot in an early stage, often before the formation of the 1st needles; spp. of *Trichothecium*, *Penicillium*, and *Aspergillus* were present but infection was caused mainly by a *Fusarium* sp. The 2nd type started in the lateral rootlets and spread upwards. The stem and needles were usually lilac colour. *Rhizoctonia* sp. is the causal agent, often with *Fusarium* spp.

Sowing should not be done in heavy soils in damp places. Control measures include ensuring rapid germination by stratification, seeds being treated beforehand with potassium permanganate and soil with formalin or sulphuric acid, and when symptoms of the diseases appear, spraying with 0·4–0·5% K permanganate, a second spray at 5–7 days' interval being given for root infection.

Porter (W. A.). **Dieback and canker on young Douglas Fir following low temperature injury.**—[*Publ.*] *Dep. Agric. Can. For. Biol. Div., Sept. 1959*, 18+2 (unnumbered) pp., 23 fig., 3 graphs, 1959. [Cyclostyled.]

Investigations by the Res. Branch into the cause of top dying and stem cankering of saplings of Douglas fir (*Pseudotsuga menziesii*) [**37**, 116] in B.C. and of western hemlock (*Tsuga heterophylla*), western red cedar (*Thuja plicata*), and Douglas fir in western Wash. indicated that fungi were probably not responsible for the initial damage, but rather the cause of continued damage and progressive deterioration following host predisposition by unusually low temps. in Nov. 1955. The fungi most frequently isolated from damaged trees were *Stereum sanguinolentum*, *Phomopsis* sp., *Dermea* sp., *Pullularia pullulans* [**38**, 718], and *Dasyscypha pseudotsugae*.

Holmsgaard (E.). **Oversigt over igangværende undersøgelser under Trametes-udvalget.** [Survey of current investigations by the Trametes committee.]

Yde-Andersen (A.). **Kerneråd i rødgran.** [Heart rot in Norway Spruce.]—*Dansk Skovforen. Tidsskr.*, **44**, 2, pp. 78–80; pp. 81–110, 7 fig., 1959. [42 ref.]

In the 1st paper, after a brief historical review of *Trametes* [*Fomes annosus*: **37**, 253; **39**, 59] on Norway spruce, the author describes the current activities of the members of the Trametes Committee set up in 1952 in Denmark.

The work reported in the 2nd paper has already been noticed [**38**, 633].

Roff (J. W.) & Eades (H. W.). **Deterioration of logging residue on the British Columbia coast.**—*Tech. Note For. Prod. Lab. Can.* 11, 38 pp., 10 fig., 1 diag., 2 graphs, 1959.

Annual examination of the logging residue salvageable for pulpwood in 2 forest areas from which the main timber had been removed [cf. **19**, 314] showed that the rate of deterioration increased rapidly after the 1st yr., in which it was mainly confined to sap staining. By the end of the 2nd yr. over 60% of the vol. of western hemlock (*Tsuga heterophylla*) and amabilis fir (*Abies amabilis*), and some 50% of Sitka spruce (*Picea sitchensis*) was visibly affected. After 4 yr. in 1 area western hemlock contained 66% advanced decay and amabilis fir 73%; in the other area, after 5 yr., western hemlock contained 84% and Sitka spruce 61%. The fungi chiefly involved were *Fomes pinicola*, *Poria monticola*, *Stereum abietinum*, *Trametes serialis*, and *Lenzites saepiaria*, all causing brown cubical rot, and *S. sanguinolentum* and *Polyporus* [*Polystictus*] *abietinus* causing white rots.

Savory (J. G.) & Pinion (L. C.). **Chemical aspects of decay of Beech wood by Chaetomium globosum.**—*Holzforschung*, **12**, 4, pp. 99–103, 1 fig., 2 graphs, 1958. [Germ. summ.]

Further studies at the Forest Products Res. Lab., England [cf. **34**, 414; **38**, 716], showed that *C. globosum* chiefly attacks the polysaccharide constituents of the cell

wall, removing them in proportion to the amounts originally present. Both α-cellulose and pentosans tend to be removed entirely, while a good deal of lignin remains, though its breakdown may eventually be increased, possibly only when associated carbohydrates are also attacked, and only to a slight extent in the heavily lignified compound middle lamella. The effects of *C. globosum* and allied fungi on wood constituents are very different from those induced by basidiomycetes.

Lyr (H.), Ziegler (H.), & Heffe (C.). **Enzymausscheidung und Holzabbau durch Phellinus igniarius Quél. und Collybia velutipes Curt.** [Enzyme secretion and wood rotting by *Fomes igniarius* and *C. velutipes*.]—*Phytopath. Z.*, **35**, 2, pp. 173–200, 9 graphs, 1959. [Engl. summ.]

Following further studies at the Inst. für Forstbot., Eberswalde, Germany [**37**, 705], the authors conclude that beech wood is broken down polyenzymatically, the enzymes attacking almost exclusively the insoluble constituents of the wood. The highest activity occurred in the 1st 70 days of fungus attack when mycelium formation and wood rotting were still slight. As the mycelium increased and decomposition products appeared enzyme activity diminished, but decomposition continued on an undiminished scale, which can be explained by the particular nature of the breakdown of highly polymerized substances. In consequence of its lower enzyme activity *C. velutipes* [loc. cit.] caused less decomposition than *F. igniarius* [**36**, 441]; the latter also decomposes lignin at a much higher rate than the former. Both can be regarded as white rot fungi.

McNabb (H. S.). **Procedures for laboratory studies on wood decay resistance.**—*Proc. Iowa Acad. Sci.*, **65**, pp. 150–159, 3 fig., 1958. [29 ref.]

A full description of the agar block and soil block laboratory procedures for studying all aspects of wood decay resistance [**34**, 333; **38**, 168].

Walker (J. C.), Larson (R. H.), & Taylor (A. L.). **Diseases of Cabbage and related plants.**—*Agric. Handb. U.S. Dep. Agric.* 144, 41 pp., 15 fig., 1958.

This publication, replacing *Fmrs' Bull. U.S. Dep. Agric.* 1439, describes the features and control of 33 diseases of cabbage and other cultivated crucifers, including parasitic and virus field diseases, those caused by nematodes, non-parasitic maladies, and transit and storage diseases.

Croxall (H. E.), Norman (Theresa M.), & Gwynne (D. C.). **Yellow mosaic of Broccoli in north-east England, 1953–57.**—*Plant Path.*, **8**, 3, pp. 99–107, 6 diags., 4 graphs, 1959.

A survey of the incidence and spread of turnip yellow mosaic virus in broccoli plants at 5 centres in Northumberland and Durham during 1953–57 [**33**, 396; **38**, 285] showed that beneficial effects followed the isolation of seed-beds, seed treatment with gamma-BHC dust, and spraying the seed-beds with DDT. The amount of infection that developed after planting-out depended upon the occurrence of sunny weather, which favours the activity of flea beetles [*Phyllotreta* and *Psylliodes* spp.], the proximity of infected brassica crops, and the degree of shelter provided by the site. In exposed situations 20 yd. isolation from severely infected crops effectively reduced spread, but in sheltered places at least 100 yd. appeared to be necessary. Roguing was advantageous, preferably in spring, before the flea-beetles emerged from hibernation. In one trial 3-row barriers of kale, barley, or broad beans significantly reduced spread.

Chalfant (R. B.). **Transmission of Cabbage viruses A and B by the Cabbage and green Peach aphids.**—*Diss. Abstr.*, **20**, 2, pp. 432–433, 1959.

In studies at Univ. Wis. it was found that the acquisition threshold for the cabbage

viruses A and B [cabbage black ring spot virus and/or cauliflower mosaic virus (str.)] by both *Myzus persicae* [cf. **36**, 813] and *Brevicoryne brassicae* [cf. **36**, 155] was 15 sec. or less, the inoculation threshold being about the same. Transmission was more effective when feeding was allowed to end naturally. A was non-persistent in both aphids and B in *M. persicae*. Prolonged acquisition periods reduced the effectiveness of transmission, few infections occurring after 5 hr. There was no transmission beyond the 2nd plant with 5-min. feeds. It appears that B is transmitted persistently or non-persistently by *B. brassicae*, according to the duration of the acquisition period, being present on the stylets during short feeds and elsewhere after long ones.

The placing in the field of a single plant infected by the cabbage mosaic complex of both viruses markedly influenced spread, but this effect became less conspicuous when there were numerous sources of virus outside the field. Sticky barriers failed to protect plants from outside infection. The incidence of the complex generally increased as the season advanced, with apparently more spread of B than A. Early infection resulted when viruliferous, winged *M. persicae* entered a field and initiated primary virus sources from which secondary spread, possibly by *B. brassicae*, occurred over short distances.

Partial control of cucumber mosaic virus in the field in 1954 and 1955 resulted from the use of parathion and from soil and foliage applications of am[monium] cyanamide 12008 and thimet. Cabbage mosaic was reduced in 1955 by thimet, 12008, and parathion foliage applications. No positive results were obtained with 5 other viruses, and the failure of insecticides to control the diseases was attributed to the entrance of numerous infections into a field from outside sources.

Rubin (B. A.) & Ivanova (Mme T. M.). Роль оксидаз аминокислот в иммунитете Капусты к **Botrytis cinerea.** [The role of amino acid oxidases in the immunity of Cabbages from *B. cinerea*.]—Биохим. Плод. Овощ. [*Biokhim. Plod. Ovoshch.*], *1959*, 5, pp. 113–132, 4 graphs, 1959. [31 ref.]

Analyses at the A.N. Bach Inst. Biochem., U.S.S.R. Acad. Sci., demonstrated 11 free amino acids and amide asparagine in the tissue of 2 cabbage vars. The resistant Amager contains 4–5 times the amount of free amino acids in the non-resistant var. No. 1. Slices of Amager showed considerable amino acid oxidase activity, especially in decomposing asparaginic and glutamic acids, as well as threonine, proline, and glycine, but not the amides of the dicarboxylic acids. The tissues of No. 1 oxidized threonine, valine, and isoleucine only slightly. In both, activity depended on the pH. Amino acid oxidase activity increased in response to infection of the tissue by *B. cinerea* [**39**, 136]. The sharpest changes were seen in Amager at the boundary of the infected tissue. A direct relationship was established between amino acid oxidase activity and the intensity of residual respiration in infected cabbage. On this basis it is suggested that the so-called residual respiration is a property of the basic amino acid oxidases. In Amager ammonia was detected near the site of infection, which indicates strong deaminization of amino acids in these tissues. On the boundary of the infected tissue, at the same time as the activation of the amino acid oxidases and functionally connected with it, there was an increase of peroxidase activity. The infiltration of *B. cinerea* toxin causes changes in the cabbage tissue similar to those caused by infection. On the basis of the data obtained it can be said that amino acid oxidases play a considerable role in the defence reactions of cabbage to *B. cinerea* and the products of its vital activity.

Lloyd (H. B.). **The transmission of Phoma lingam (Tode) Desm. in the seeds of Swede, Turnip, Chou Moellier, Rape, and Kale.**—*N.Z.J. agric. Res.*, **2**, 4, pp. 649–658, 4 fig., 1959.

P. lingam [**37**, 7], a serious disease of swede and turnip in N.Z., is of less importance

on chou moellier, rape, and kale. A survey at the Seed Testing Sta., Palmerston North, in 1957 and 1958 showed 223 seed samples from 263 to be free from infection and there was generally only 0·1% infection in the diseased samples. The seeds were examined by a modification of Hagborg's method [**29**, 283], using tap-water agar and 2,000 p.p.m. of the Na salt of 2,4-D, incubated at 23° C. for 12 days, and then examined under a binocular microscope. Approx. 50% of the infected seed did not germinate; most infection was in the smallest seeds, largely removed in seed cleaning. The fungus remained viable in stored seed for 14 months, but died in some after 8 months. The primary spread of the pathogen appears more likely to result from air-borne infection than from seed-borne.

Hull (R.). **Virus yellows was decreased by spraying. Precautions for 1960.** —*Brit. Sug. Beet Rev.*, **28**, 1, p. 24, 1959.

It is estimated that from 75 to 90% of the area under sugar beet in Great Britain was sprayed with a systemic insecticide during June 1959 [**37**, 747]. In E. Anglia yellows virus is so prevalent and spraying gives such good returns that the practice is an annual routine on many farms. Growers are advised to harvest and store mangold and fodder beet in the autumn to avoid the risk of spring infestation by aphids (principally *Myzus persicae*). Roots for late use (after April) should be topped closely and placed in a separate clamp; the remainder of the crop can be treated normally, cutting just above the lowest leaf scar. The number of aphids introduced into the clamps may also be reduced by spraying the growing mangold crops shortly before harvesting.

Wiesner (K.). **Die Bedeutung der virösen Rübenvergiftung für die DDR. I. Das Auftreten dieser Virose in den Jahren 1954 bis 1958.** [The importance for the German Democratic Republic of virus toxicity to Beets. I. The occurrence of this virosis in the years 1954 to 1958.] —*Zuckererzeugung*, **3**, 9, pp. 240–244, 1959.

From the results of an extensive survey conducted by the Institut für Pflanzenzüchtung, Kleinwanzleben, Einbeck (Hann.) the epidemic nature of yellows virus in beet crops appears to be conclusive: in 1955, a year of mild infection, it was almost ubiquitous. In all 5 yr. the principal focus was round Leipzig, with fairly severe outbreaks in the Oderbruch region, the main centre of production. But in comparison with N.W. Europe, av. incidence for the whole Republic in 1954, the year of heaviest attacks, was only 10%.

The regional distribution of beet yellows virus was compared with that of potato virus degeneration, and certain similarities pointed to the significance of the peach aphid [*Myzus persicae*] in the development of epiphytotics of yellows. However, these were also dependent on the proximity of beet seed-bearers.

Gates (L. F.). **Further experiments on black-leg disease of Sugar-Beet seedlings.**—*Ann. appl. Biol.*, **47**, 3, pp. 502–510, 1 graph, 1959.

In further studies at Rothamsted Field Sta., near Lincoln [cf. **34**, 692], soaking sugar beet seed for 20 min. in 10 times its wt. of water containing 40 p.p.m. ethyl mercury phosphate against seed-borne *Phoma* [*Pleospora*] *betae* [cf. **36**, 376] induced better seedling emergence than surface treatments with organo-mercury dusts, panogen, thiram, granosan M, captan, dow 9 B [cf. **35**, 152], or cerenox. In 4-yr. field trials, soaking seed in ethyl mercury phosphate solution followed by insecticidal dusting, as compared with routine Hg treatment + insecticidal dust, increased emergence at 53 of 59 sites by an av. of 10% under good conditions for emergence and 20–30% under poor conditions, the final stand being increased each year by an av. of 5·8, 3·4, 1·8, and 0·6%, respectively.

Canova (A.). **Ricerche su la biologia e l'epidemiologia della Cercospora beticola Sacc. Parte III. Parte IV. Parte V.** [Researches on the biology and epidemiology of *C. beticola*. Part III. Part IV. Part V.] *Ann. Sper. agr.*, N.S., **13**. 3, pp. 477–497, 2 pl.; 4, pp. 685 776, 18 pl., 1 fig., 5 graphs; 5, pp. 855–897, 3 pl., 1 graph, 1959. [Engl. summ. 162 ref.]

Further studies [**38**, 493] showed that at about 30° C. and in a saturated atmosphere abundant conidia were formed on green beet leaves in 12-14 hr., though development was much curtailed and prolonged below 10° and over 35°, and inhibited, even in opt. temp. conditions, at R.H. < 85%. Though unaffected by the presence or absence of diffused light, it was much reduced by direct sunlight. In the field in June–Sept. production, which occurred on both leaf surfaces, was correlated with the condition of the leaf blades; being less and taking longer on spots on senescent than on green leaves; it varied also with the age of the lesion, with a max. shortly after complete differentiation, i.e., in 8–15 days in nature or 3–4 days at the most at opt. temp. and moisture (av. 3-4 to 6–8 days). Conidial formation in the field occurs only over a few hr. in the night; during the initial period of spread, June–July, the rate does not vary greatly in leaves at different stages of maturity, though in Aug.-Sept. such differences are considerable. Spore liberation occurs usually in the presence of water or high R.H., and they are generally wind-borne.

In the 4th part evidence is presented that infection can occur only through the stomata and takes place readily by means of an infection hypha if they are completely open, but not nearly so readily when half-open. The germ tubes are positively hydrotropic, and the infection hyphae especially so. This hydrotropic reaction reaches a max. at R.H. 96–98%, is still apparent at 92-93%, but disappears below 70%. Under experimental conditions infection reached a max. at about 92% R.H. and also occurred, but was much delayed, at 60%.

Infection was less active at 30° than at 25° and did not take place at 35°. When the stomata are completely open (8–9 μ), a very high percentage of infection is obtained in 2–3 days after inoculation; as the opening diminishes this decreases and infection takes longer, though occurring even when the opening measures only 1–1·5 μ. Infection is more active in mature than in young or old leaves, probably, because stomatal activity is highest in the former.

In the field infection occurs between 4–8 a.m. During invasion, the cells immediately surrounding the mycelium develop a secondary periderm round the invaded area. The incubation period averages 7–8 days at 30°, 9-10 at 25°, and 19–21 at 15°.

In normal conditions the leaf spot becomes typically differentiated in 1–3 days. In addition to typical spots there were large, indefinite areas of necrotic tissue, which characterize the 'spreading' phase of the disease as distinct from the 'macular' phase (very small leaf spots). The 'spreading' phase is frequent in old and very young leaves, especially when the disease starts in old leaves or in young leaves of the new growth in late summer. The very small lesions are usually associated with leaves in full activity infected during summer.

As the leaf spot becomes completely differentiated the mycelium increases appreciably, becomes denser in the subepidermal layer, and forms 'stromatic bodies' and conidiophores which emerge through the stomata. In green, turgid leaves the conidiophores form at R.H. 80–82%, as against 85-87% for the conidia; in drier leaves a moisture content of over 99% is required. The considerable difference between the number of small bundles of conidiophores and the number of conidiophores/small bundle on either side of the leaf is related to dew.

The perpetuation of *C. beticola* in unfavourable conditions and in the absence of beet is chiefly by means of mycelium and spores carried on the seed and in leaf detritus on the ground; on the ground, *C. beticola* is able to survive for 12–18 months, even if buried 30–50 cm. deep in the soil. Infection by *C. beticola* was found

in nature on self-sown *Amaranthus albus*, *A. deflexus*, *Verbena officinalis*, and *Chenopodium* sp.

In part V the author discusses the variability in the degree of susceptibility of beet leaves to infection at different periods of growth. That susceptibility varies also with the age of the plant as a whole, increasing when the plant ages, is considered to be true only to a slight extent. Susceptibility is, however, modified by the availability of nutrients present in the soil and the general health of the plant. There appear to be strains of *C. beticola* with different degrees of pathogenicity. The toxicity of well-known fungicides to the fungus is very high. On the whole, plants treated with Bordeaux mixture gave smaller yields than those treated with dithane.

HAGEDORN (D. J.). **Disease-resistant canning Pea varieties, New Season and New Wales.**—Abs. in *Phytopathology*, **49**, 9, p. 540, 1959.

These new vars. released from Wis. agric. Exp. Sta. are resistant to *Fusarium oxysporum* f. *pisi* [**38**. 345] races 1 and 2 and to bean virus 2 [bean yellow mosaic virus: **30**. 91].

ROSENKRANZ (E.) & HAGEDORN (D. J.). **Chenopodium amaranticolor as a local-lesion test plant for the Wisconsin Pea streak virus (WPSV).**—Abs. in *Phytopathology*, **49**, 9, pp. 548–549, 1959.

C. amaranticolor remains susceptible to the virus [**38**. 172] for a long period, developing discrete, circular, necrotic lesions 2–4 mm. diam. Brush inoculation, virus dilution 1:1,000, temp. 16–20° C., and a photoperiod of 6 hr. produce the best results. Lesions develop better at 150 ft.-c. than at 350, and plants are best used at the 13–14 leaf stage, centre leaves giving the most uniform results. Incubation is shortest in the oldest leaves, but sensitivity most in the youngest. Lesion counts are best made 7 days after inoculation. There may be a positive correlation between N levels and the number of lesions.

ANDRÉN (F.) & OLOFSSON (B.). **Bekämpningsförsök mot Bönfläcksjuka.** [Control experiments against Bean anthracnose.] *Växtskyddsnotiser, Stockh.*, **23**, 1, pp. 3–4, 1 fig., 1959.

In 1958 the treatment of var. Ohlsenia bean [*Phaseolus vulgaris*] seed with 4 standard fungicides and an experimental preparation increased germination to some extent but failed to improve the quality of the crop. On the other hand, spraying shortly before flowering with Cu oxychloride, zineb (both at conc. of 0·5%), and an organic tin compound (0·25) conferred effective protection against *Colletotrichum lindemuthianum*. The use of zineb is recommended as carrying the least risk to the consumer from residues on the pods.

MALOY (O. C.) & BURKHOLDER (W. H.). **Some effects of crop rotation on the Fusarium root rot of Bean.** *Phytopathology*, **49**, 9, pp. 583–587, 1 graph, 1959.

The information from these studies of *F. solani* f.sp. *phaseoli* on *Phaseolus vulgaris* has been noticed [**38**, 723].

KEFFORD (R. O.). **French Bean seed certification scheme. List of certified growers, season 1958–59.** *J. Agric. Vict.*, **57**, 9, pp. 569–571, 584, 3 fig., 1959.

In this annual review of halo blight (*Pseudomonas medicaginis* var. [f.sp.] *phaseolicola*) [*P. phaseolicola*: **38**, 112] on French bean [*Phaseolus vulgaris*] it is stated that ample stocks of certified seed are available for the 1st time for purchase by growers of green beans in Victoria since the inception of the Certification Scheme. The working of the Scheme is explained.

Chant (S. R.). **Viruses of Cowpea, Vigna unguiculata (L.) Walp., in Nigeria.**—*Ann. appl. Biol.*, **47**, 3, pp. 565–572, 1 pl. (8 fig.), 1959.

In studies at the Federal Dept agric. Res., Moor Plantation, Ibadan, the cowpea strain of tobacco mosaic virus [**35**, 415; **38**, 655] was isolated from a number of economic leguminous hosts, the symptoms on which are described, but was uncommon in cultivated crops of cowpea. Infection of cowpea did not cause yellowing, but produced only a mild, green leaf mottle, and in southern Nigeria, though virus infection was commonly present, only a small proportion of cowpea plants contained tobacco mosaic virus.

A new virus of cowpea was also found locally and referred to as 'cowpea yellow mosaic' virus. It had a thermal inactivation point of 56° C. and a longevity *in vitro* of only 4 days at 25°. It produced local lesions in *Phaseolus vulgaris* and local and systemic lesions in Bengal bean (*Mucuna aterrima*), but failed to infect Lima bean (*P. lunatus*), thus distinguishing it from the Trinidad virus on cowpea [**29**, 192], and other leguminous hosts. Inoculated primary leaves of cowpea developed a faint, diffuse mottle 3 days later, but the 1st trifoliate leaves usually only vein-clearing and the 2nd a chlorotic mosaic and occasional distortion: later leaves were invariably distorted, with a yellow mosaic. Infected plants grew slowly and were stunted.

Both these viruses were transmitted by the beetle *Ootheca mutabilis*, which loses infectivity within 48 hr. of leaving infected plants [cf. **33**, 201].

Thomason (I. J.), Erwin (D. C.), & Garber (M. J.). **The relationship of the root-knot nematode, Meloidogyne javanica, to Fusarium wilt of Cowpea.** *Phytopathology*, **49**, 9, pp. 602–606, 1 fig., 2 graphs, 1959. [24 ref.]

In greenhouse studies at Univ. Calif. Citrus Exp. Sta., Riverside, soil inoculation with *F. oxysporum* f. [*bulbigenum* var.] *tracheiphilum* [**37**, 127] caused no wilt in the resistant Grant cowpea and but little in the susceptible Chino 3, though root inoculation (immersion in a spore suspension) caused severe wilt in the latter, and little in the former. When, on the other hand, *M. javanica* was present in *Fusarium* infested soil, Grant wilted more than Chino 3. Various field nematicide treatments reduced the wilt ratings for Grant by 70–80% and for Chino 3 by 41–86%.

Dunleavy (J.). **Survey of races of Peronospora manshurica in the United States.**—Abs. in *Phytopathology*, **49**, 9, pp. 537–538, 1959.

Seed encrusted with oospores of *P. manshurica* [**38**, 50] was found in 73% of the soybean seed samples from 200 locations in 21 States, 1 sample having 20% such seed. Race 8, predominant in northern soybean-producing areas, was found in 6 States; elsewhere race distribution was diversified. In all, 23 pathogenically distinct isolates, differentiated on 11 vars., were obtained, including all 8 previously described races [**30**, 94]. Mendota, Kanrich, Kanro, and Midwest were resistant to all isolates, Bansei and Grant susceptible.

Pederson (V. D.). **A new method of obtaining systemic infection of Soybeans by Peronospora manshurica (Naoum.) Syd.**—*Proc. Iowa Acad. Sci.*, **65**, pp. 146–149, 1 fig., 1958.

At the Dept Bot. Plant Path., Iowa State Coll., systemic infection of Hawkeye seedlings was obtained by placing finely pulverized dried soybean leaves containing oospores, collected the previous season, between the cotyledons after removal of the testa. Surface treatment did not cause infection. Preservation of dried, infected soybean leaves containing oospores would provide a method for the maintenance of physiologic races [cf. above].

Dunleavy (J.). **Studies of a seedling blight of Soybeans and the etiology of the causal fungus, Diaporthe phaseolorum var. caulivora.** *Proc. Iowa Acad. Sci.*, **65**, pp. 131–145, 3 fig., 5 graphs, 1958. [13 ref.]

Inoculation tests at the Dept Bot. Plant Path., Iowa State Coll., demonstrated that *D. phaseolorum* var. *caulivora* [**36**, 447; **38**, 50] could cause seedling rot of Hawkeye soybeans, more severe infection of cotyledons, stems, and roots occurring when the inoculum was placed above the seeds than below; greatest damage to cotyledons and stems occurred at R.H. 90–100%. Plants from sowings in rows adjacent to stems with perithecial initials developed 61% infection. In soil opt. lateral mycelial growth was at 25° C., pH 6–7, and 25% soil water content; perithecia and viable ascospores were formed within 30–35 days; and the best growth was with a high organic matter content (2%). Perithecial initials formed in alternating light and darkness, but mature perithecia and viable ascospores formed only in the dark; the fungus may overwinter on infected soybean stems and as mycelium in soil.

Jones (J. P.) & Hartwig (E. E.). **A simplified method for field inoculation of Soybeans with bacteria.** *Plant Dis. Reptr.* **43**, 8, p. 946, 1959.

At the Miss. agric. Exp. Sta., Stoneville, suitable inoculum of *Xanthomonas phaseoli* var. *sojense* [**36**, 633] was obtained by chopping 10 freshly picked, moderately infected leaflets and comminuting with 300–600 ml. tap water in a food blender; after standing for 1–2 hr. the suspension is filtered through 2 layers of cheesecloth, made up to 1 gal., and applied as a spray. Minced, infected leaflets can be stored for 12–24 months in capped jars at 0–20° F. and used in the same way.

Garren (K. H.). **Effectiveness of non-dirting cultivation and soil-surface applications of PCNB in controlling Peanut stem rot in Virginia.**—*Plant Dis. Reptr*, **43**, 7, pp. 750–752, 1959.

Further trials at Tidewater Res. Sta., Holland, Va showed that although PCNB [cf. **37**, 694] was effective in conjunction with dirting cultivation of groundnuts its value in controlling *Sclerotium rolfsii* with non-dirting cultivation is doubtful.

Coley-Smith (J. R.). **Studies on the biology of Sclerotium cepivorum Berk. III. Host range; persistence and viability of sclerotia.** *Ann. appl. Biol.*, **47**, 3, pp. 511–518, 1959.

In continued studies at Univ. Birmingham [cf. **37**, 63] only members of the genus *Allium* could be experimentally infected with *S. cepivorum*. Sclerotia withstood, almost without effect, 2 yrs.' dry storage in the laboratory, while under undisturbed conditions they persisted in the field for 4 yr. with small loss of viability. Persistence was unaffected by soil pH, soil nutrient status, or inorganic supplementation. Organic soil supplements produced varying results, sometimes reducing sclerotial numbers, sometimes not. Weekly rubbing of nylon bags containing soil and sclerotia brought about the disappearance of the sclerotia as a result of germination followed by decay; monthly rubbing had no effect on persistence nor did weekly trowelling of soil containing sclerotia. It is concluded that the sclerotia of *S. cepivorum* can persist in soil for many years in the absence of a host.

Duran (R.) & Fischer (G. W.). **The efficacy and limitations of hexachlorobenzene for the control of Onion smut.**—*Plant Dis. Reptr*, **43**, 8, pp. 880–888, 4 fig., 1959.

In tests over 2 yr. by Wash. State Univ. agric. Exp. Sta., Pullman, pelleting onion seed with 80% hexachlorobenzene reduced infection by *Urocystis cepulae* [cf. **35**, 381] from 92 to 0·41% in naturally infested soil. At present, however, the only formulation that can be recommended is anticarie 80 (H.P. Rossiger Co., Inc.),

others having proved less effective, or even markedly phytotoxic; the cause is unknown but may be due to auxin inhibition and related to the diluent used or some impurity.

Takahashi (M.), Tanaka (Y.), & Oishi (C.). **Studies on the downy mildew of Onion. I. Formation and germination of oospore.**—*Ann. phytopath. Soc. Japan*, **23**, 3, pp. 117–120, 3 fig., 1958. [Jap. Abs. from Engl. summ.]

At Osaka Prefectural Univ., Sakai, the formation of oospores in a physiologic race of *Peronospora schleideniana* [*P. destructor*: **10**, 7] with specialized oospore size, germination habit, and pathogenicity, appeared probably to be related to the age of the host leaves, and took place at above 17° C. Germination occurred in water, soil, and on seedling leaves at 20–30°, but not below 12° or above 40°, and was accelerated by pretreatment with $KMnO_4$ or low temp [cf. **18**, 778]. Oospores present in the soil constitute the source of primary infection to onion seedlings.

Couto (F. A. A.). **Sintomas de deficiência mineral em Alho.** [Symptoms of mineral deficiency in Garlic.]—*Ceres*, **10**, 59, pp. 402–412, 6 col. fig., 1958. [Engl. summ.]

The typical symptoms in plants grown in sand culture without N, P, K, Ca, Mg, and Zn are described. The response of plants grown from buds separated from the storage leaf differed in several respects from that of those developing from the whole bulb because the storage leaf supplies some of the nutrient requirements.

Khandobina (Mme L. M.) & Ozeretskovskaya (Mme O. L.). Процессы окисления в корнях Моркови, пораженных фомозом. [Oxidation processes in Carrot roots infected by phomosis.]—Биохим. Плод. Овощ. [*Biokhim. Plod. Ovoshch.*]. *1959*, 5, pp. 133–145, 7 graphs, 1959. [27 ref.]

In studies begun in 1954 at Dept Plant Physiol., Moscow State Univ., it was found that infection of carrot roots by *Phoma rostrupii* [**34**, 203] induced a reaction, defensive in character; O consumption and CO_2 generation were increased, the latter to a greater extent. The most intensive respiration occurred when roots were most resistant to *P. rostrupii*. In infected roots polyphenoloxidase activity is greater than in healthy (slight activity), while the greatest increase occurs at the beginning of the storage period (Sept., Oct.) and again at the end (May, June). During the last months of storage, activity is lower than in healthy roots. The changes in activity of peroxidase and polyphenoloxidase are opposites, i.e. the min. peroxidase activity corresponds with the max. polyphenoloxidase, and vice versa. The strongest reaction to infection, reflected in an intensification of the oxidizing processes, is round the infected and blackened tissue. Activation gradually decreases to a specific level beyond which the respiratory processes of infected roots are depressed below healthy. It is postulated that infection brings about a mobilization of metabolic products, which may include various phosphorous compounds, to be used for respiration, from the most distant parts towards the point where the parasite entered the host.

Murakishi (H. H.), Honma (S.), & Knutson (R.). **A seedling test for determining resistance in Celery to Cercospora early blight.**—Abs. in *Phytopathology*, **49**, 9, p. 546, 1959.

An aqueous suspension of 5,000–10,000 conidia ml. of *Cercospora apii* [**38**, 175] from Kilpatrick's carrot leaf agar was atomized onto seedlings at the 4- to 6-leaf stage, which were held in a humidity chamber at 75–80° F. for 48–72 hr. and assessed for disease after 10–14 days in the greenhouse [at Michigan State University]. The technique facilitated screening for resistance and gave results closely correlated with those of field tests.

Lewis (G. D.). **Effects of temperature and crop rotation on the occurrence of brown spot of Celery in southern New York.** *Plant Dis. Reptr.* **43**, 10, pp. 1079–1080, 1959.

Laboratory tests at Rutgers Univ., New Brunswick, N.J., showed that lesions caused by *Cephalosporium apii* [**38**, 113], serious in southern N.Y. State only in summer, develop more rapidly at 75° F. than at 55°. Control of the disease by crop rotation indicated that the fungus is soil- or refuse-borne but does not persist long in the absence of celery.

Schnathorst (W. C.). **Resistance in Lettuce to powdery mildew related to osmotic value.**—*Phytopathology*, **49**, 9, pp. 562–571, 3 fig., 1959. [31 ref.]

Further studies at Univ. Calif., Davis [**39**, 142], suggested that the resistance of commercial lettuce vars. to the lettuce str. of *Erysiphe cichoracearum* is due to physiological rather than morphological factors. Environment plays a considerable part in determining the field reaction of a var. Powdery mildew develops more profusely when lettuce is infected by lettuce mosaic virus [**39**, 68]. The resistance of resistant leaves of field-susceptible vars. was decreased by floating detached leaves in distilled water under continuous subdued illumination (300 ft.-c. at the leaf surface) or by subjecting potted plants to these conditions, which had no effect on cuticular or epidermal wall thickness. Seedlings in the field are not susceptible before the 10-leaf stage. Physico-chemical mechanisms appear to be involved, one of which seems to be differences in osmotic value. The values for field-resistant plants and resistant leaves of field-susceptible plants were great enough to inhibit water uptake and the growth of the fungus. The suggestion that resistance is due, at least in part, to this factor is consistent with the observed reactions of plants in the field.

Fusarium wilts and footrot of cucurbits. *Agric. Gaz. N.S.W.*, **70**, 6, pp. 310–311, 1 fig., 1959.

F. oxysporum f. [*F. bulbigenum* var.] *niveum* on watermelon [**17**, 298], *F. oxysporum* f. *melonis* on rock melon [**37**, 64], and *F. solani* f. *cucurbitae* [**35**, 422] on pumpkin, squash, and marrow were identified as the pathogens involved. Rotation of crops, selection of resistant vars., use of disease-free seed, and the growing of seedlings in separate pots are the suggested methods of control.

Akai (S.), Yasumori (H.), & Terasawa (H.). **On the resistance of Cucumber varieties to anthracnose and the behaviour of the causal fungus in the invasion of the host tissues.**—*Forsch. PflKr., Kyoto*, **6**, 3, pp. 97–103, 1959.

Colletotrichum lagenarium [cf. **37**, 752] inoculated onto mature leaves invaded all vars. tested of squash (which are all highly resistant) and cucumber (Tsuda Sanjaku, Sekino No. 2, and wild cucumber, resistant; Su-Yo, and Kwachu-Zairai, susceptible) but different var. reactions occurred depending on whether cotyledons or mature leaves were inoculated, e.g. cotyledons of Shiro-Kikuza squash were slightly affected, mature leaves were not. The rate of lesion development was the same in all the cucumber vars. and the mycelium developed equally well in resistant and susceptible vars. after becoming established. Sap extracts of cotyledons of both resistant and susceptible vars. stimulated conidial germination. The number of infection hyphae, however, formed from appressoria on the cotyledons, differed among the vars., and this presumably accounted for the differences in reaction, which may also be correlated with the nature of the epidermal wall.

Jenkins (S. F.) & Winstead (N. N.). **A new Colletotrichum on the cucurbits.**—Abs. in *Phytopathology*, **49**, 9, p. 542, 1959.

This sp., which differs from *C. lagenarium* [**38**, 647] in morphology, pathogenicity,

and cultural characteristics, was isolated from Blacklee watermelon fruit in N. Carol. Conidia are 24–36 (28) × 4·5–4·8 μ, both *in vitro* and *in vivo*. The pathogen, less virulent on cucumber and watermelon than *C. lagenarium*, caused seedling damping-off and fruit rot, lesions on watermelon fruits often reaching 5 in. or more in diam. Squash and pumpkin were more susceptible to inoculation than watermelon and cucumber. The fungus is seed-borne and overwinters as small black sclerotial structures on seed from infected fruit.

Fisher (R. W.). **Polybutenes—a promising control for powdery mildew.**—*Plant Dis. Reptr*, **43**, 8, pp. 878–879, 2 fig., 1959.

At the Ont. hort. Exp. Sta., Canada, 5% emulsions of Indopol polybutenes (Amoco Chemical Corp., Chicago) protected greenhouse cucumbers from infection by *Erysiphe cichoracearum* for at least 1 month (unsprayed plants or parts of the same plant heavily mildewed), and were effective in checking established infection. Similar results were obtained with *Sphaerotheca pannosa* on roses.

Bhargava (K. S.) & Joshi (R. D.). **A virus disease of Tree Tomato—Cyphomandra betacea Sendt.—due to Potato virus Y.**—*Amer. Potato J.*, **36**, 8, pp. 288–291, 1 fig., 1959.

This disease, investigated by the D.S.B. Government College, Naini Tal, India, was first seen in a garden in Bhimtal in winter 1957–8 and subsequently in a number of areas locally, more than 50% of the tree tomatoes inspected being severely affected. There was no apparent loss in the vigour of affected plants but the young leaves developed light and dark green mottling with dark green areas along the veins, sometimes involving the entire leaf surface. Symptoms were less pronounced in the hot months, Apr.–July. The fruits developed dark blemishes of irregular shape and yield was much reduced. Studies of the host range, physical characteristics, and serology showed the causative virus to be potato virus Y [cf. **34**, 514]. As the tree tomato harbours *Myzus persicae* and other insects in the winter, diseased plants are a likely source of infection for potatoes, the principal local crop.

Nukumizu (T.), Andô (M.), & Dôzono (Y.). **On the ecological, physiological and morphological characters of the fruit body of 'Shiitake', Cortinellus edodes (Berk.) S. Ito et Imai.**—*Bull. For. Exp. Sta., Meguro*, 116, pp. 27–57, 1 fig., 115 graphs, 1959. [Jap. Abs. from Engl. summ.]

Pure cultures of 34 strains of *C. edodes* [**34**, 333] collected by the Miyazaki Subbranch of the For. Exp. Sta. from various districts of Japan were grown on bed logs over 5 yrs. They fell into 3 types: spring-growing (most common), autumn-growing, and intermediate. Remarkable differences were found between the strains in dry wt. or number of fruit bodies. Ecological, physiological, and morphological vars. were considerable, though the diam. of the pileus always matched with the length of the stem and the thickness of the pileus the stem diam.

Corte (A.), Ciferri (R.), & Scaramuzzi (G.). **Trasmissione della 'degenerazione infettiva' della Vite sul Ligustrum lucidum Ait. ed altre specie arboree.** [Transmission of 'infectious degeneration' of the Vine to *L. lucidum* and other woody species.]—Reprinted from *Riv. Vitic.*, *1959*, 7, 10 pp. (unnumbered), 3 fig., 1959. [Engl. summ.]

In this preliminary account of work still in progress it is stated that infectious degeneration of the vine [cf. **38**, 356; **39**, 148] was transmitted by chip-budding to 4 of 82 woody spp. not belonging to the Vitaceae; glossy privet (*Ligustrum lucidum*) was the most susceptible, almost all the symptoms found on Barbera, Kober 5 BB, and Rupestris du Lot vines developing on it, together with ringspot, line pattern, mosaic, and absence of cuticle on areas of the lower leaf surface. About half the

symptoms found on vine developed on Mazzard F 12/1 cherry and *Rhamnus purshiana* and about one quarter on myrobalan seedlings [*Prunus cerasifera* var. *divaricata*].

[A more detailed account has appeared in *Progr. agric.*, **5**, 9, pp. 1044–1047, 6 fig., 1959.]

Borzini (G.). **Impolveratrici elettrostatiche ed uso di elicotteri in fitoiatria.** [Electrostatic dusting machines and the use of helicopters in plant disease control.] – *Progr. agric.*, **5**, 9, pp. 1049–1057, 7 fig., 1959.

After dealing with the use of a helicopter for insecticidal treatments, the author describes the use of an electrostatic machine, the Electroduster [cf. **39**, 214], to treat Barbera vines against downy mildew [*Plasmopara viticola*] with zineb + S dust (40 kg. ha.) mixed by the manufacturers for use with such a machine, Cu oxychloride (16% Cu at 8–10 or more kg. ha.) – ventilated S, and a spray mixture of Cu oxychloride – wettable S. All the treatments were applied 7 times, on the same dates. On 11 July the percentages of infected leaves (av. of 5 plots) in the 3 treatments, respectively, were 0·85, 5·25, and 1·95. The results given by zineb + S dust applied in this manner are considered to be interesting and to merit further investigation.

Harvey (J. M.). **Reduction of decay in storage grapes by field applications of captan.**—*Plant Dis. Reptr*, **43**, 8, pp. 889–892, 3 graphs, 1959.

Further observations by the U.S. Dept Agric. at Fresno, Calif. [cf. **36**, 374], have shown that the incidence of grey mould (*Botrytis cinerea*) on Emperor grapes stored at 32° F. is dependent on harvest date and is highest when the fruit is picked after rain, whereas *Cladosporium herbarum* and *Alternaria* spp. predominate after dry weather. Pre-harvest infection by *B. cinerea* is effectively controlled by 3 applications of captan at monthly intervals before rainfall; 1 application afterwards was not effective; in dry years captan is of little benefit [**34**, 625].

Masurat (G.) & Stephan (S.). **Das Auftreten der wichtigsten Krankheiten und Schädlinge der landwirtschaftlichen und gärtnerischen Kulturpflanzen im Jahre 1957 im Bereich der Deutschen Demokratischen Republik.** [The occurrence of the most important diseases and pests of crop and garden plants in the year 1957 in the zone of the German Democratic Republic.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **13**, 4, pp. 61–74, 8 maps, 1959.

Attacks of *Ustilago zeae* [*U. maydis*] on maize, most severe in the Potsdam, Cottbus, Frankfurt O., Magdeburg, and Halle districts, were considerable by comparison with preceding years [cf. **37**, 201]. Considerable losses of stored potatoes from wet rot (*Erwinia* sp.) were reported from all areas, and the warm dry June weather led to widespread infection by *Streptomyces scabies*, the affected area being larger than at any time since 1953. Beet downy mildew (*Peronospora schachtii*) was rather widespread in the Leipzig region and to a lesser extent in the Halle region, and a number of heavy losses were reported. There were heavy attacks of *Erysiphe polygoni* on clover in the regions Leipzig, Dresden, and Karl-Marx-Stadt. A marked increase in *P. schleidenii* [*P. destructor*] on onion was observed in all the growing areas of Central Germany. Outbreaks of *E. cichoracearum* on cucumber were much more frequent than in earlier years. In the Halle region bean rust (*Uromyces appendiculatus*) was severe: elsewhere attacks were weak to moderate, though more frequent than usual. There was considerable cucumber wilt (*Fusarium* sp.) in all regions. Peach leaf curl (*Taphrina deformans*) was unusually severe, particularly in the Potsdam region.

Démétriadès (S. D.), Zachos (D. G.), Papaïoannou (A. J.), & Constantinou (P. T.). **Rapport sommaire sur les principales maladies des plantes cultivées, observées en Grèce au cours de l'année 1957.**

Démétriadès (S. D.), Zachos (D. G.), Constantinou (P. T.), Panagopulos (C. G.), & Holevas (C. D.). **Rapport sommaire sur les principales maladies des plantes cultivées, observées en Grèce au cours de l'année 1958.** [Brief reports on the principal plant diseases observed in Greece during the years 1957, 1958.]—*Ann. Inst. phytopath. Benaki*, N.S., **1**, 6, pp. 323–329, 1958; **2**, 1, pp. 3–11, 1959.

In the 1st report [cf. **37**, 635] the following items *inter alia* are listed. Olives in nurseries at Amarussion (Attica) were affected by *Verticillium alboatrum*. In the area of Athens and at Xylocastro *Septoria pistacina* [**37**, 192] was noted on pistachio nut. *Xanthomonas malvacearum* caused losses of 50–60% on cotton in several areas, including the island of Lemnos. Frenching of tobacco was reported from Pizomala (Imathy), for the first time in Greece. *Corynebacterium sepedonicum* [**37**, 132] was found on seed potato tubers imported from Canada. Damage caused on *Cicer arietinum* by *Ascochyta rabiei* [**34**, 126] amounted to 10–20%.

The 2nd report mentions infectious degeneration of vine [**38**, 53] in several areas. On the island of Leucas > 15% of the var. Vadzami was affected. Fruit of the carob tree on Samos was attacked by *Diplodina ceratoniae*. *Gnomonia erythrostoma* [cf. **29**, 104] was noted on the leaves of cherry at Pythia (Imathy). Leaves and fruit of medlar were infested by *Fusicladium eriobotryae* [cf. **33**, 384] in several areas. *Entomosporium maculatum* [*Fabraea maculata*: map 327] was noticed on the leaves of pear at Servia (Kozani). In Kifissia lettuce was affected by *Bremia lactucae* [map 86]. Hadromycosis (*V. alboatrum*) caused damage to potatoes at Oropos (Attica). *Cercosporella herpotrichoides* [map 74] attacked wheat, and more especially barley, in the Ptolemaid area. Rust (*Phragmidium mucronatum*) was observed on roses in Kifissia.

Georgopoulos (S. G.). **Some diseases of cultivated plants hitherto unreported from Greece.**—*Ann. Inst. phytopath. Benaki*, N.S., **1**, 6, pp. 334–343, 2 pl. (6 fig.), 1958. [20 ref.]

In several places Egyptian clover (*Trifolium alexandrinum*) was attacked by *Stagonospora recedens* [cf. **34**, 372]. *Dilophospora alopecuri* [cf. **37**, 415] occurred on some ears of wheat from Amalias Helias. Diseases of hops included *Armillaria* [*mellea*] root-rot, downy mildew (*Pseudoperonospora humuli*) [map 14], powdery mildew (*Sphaerotheca humuli*), which occurred only on wild hops, and canker, attributed to *Fusarium* ? *sambucinum*, which attacked bines of the Hallerton var. A survey of leaf spot of groundnuts in Messinia and Lakonia in 1957–8 disclosed only *Cercospora personata* [*Mycosphaerella berkeleyi*: map 152]. Near Pyrgos (Peloponnesus) *Didymella* stem rot (*D. lycopersici*) [map 324] was serious on tomatoes, both indoor and outdoor.

Bates (G. R.). **Branch of Botany, Plant Pathology and Seed Testing.**—*Rep. Minist. Agric. Rhod. Nyasald 1957–8*, pp. 26–33, 1959.

In this report [mostly concerning Southern Rhodesia: cf. **38**, 295] for the yr. ended 30 Sept. 1958, reports of new hosts and diseases include *Phytophthora infestans* on eggplant, *Leveillula taurica* and *Fusarium bulbigenum* var. *lycopersici* on tomatoes, *Phyllosticta ricini* on castor beans, *Colletotrichum trifolii* on lucerne, *Glomerella cingulata* on kenaf (*Hibiscus cannabinus*) and *Citropsis daweana*, *Piricularia grisea* on *Cynodon plectostachya*, *Colletotrichum graminicola* on sorghum, and maize streak virus on *Eleusine indica*. Angular spot [*Pseudomonas angulata*: **36**, 380] was particularly troublesome on tobacco and was found in seedbeds several weeks earlier

than recorded over the past 30 yr. Anthracnose (*C. tabacum*) was the main tobacco disease for the 2nd successive season, being widespread in seedbeds of Virginia and Turkish vars. Seed treatment with 1:1,000 $AgNO_3$ [cf. **36**, 428] did not prevent transmission of the disease [cf. **38**, 560].

Maize streak virus [**37**, 39] was unexpectedly widespread in high veld crops. Characteristic chlorotic lesions arranged in ring pattern, often with a more general speckling, were frequently observed on hybrid and double hybrid maize, particularly on the lower leaves of the single hybrid N 3–2–3–3. A similar condition, known as 'leopard spot', has been noted in Kenya. The local disorder closely resembles a disease recently reported from W. Africa [**38**, 515].

Although *Alternaria ricini* and *Xanthomonas ricinola* were widespread they did not cause serious damage to castor bean [*Ricinus communis*]. Laboratory tests revealed that the 1st named was seed-borne and could not be completely controlled by seed dressing. At Gwebi seedlings were infected by *Phytophthora parasitica* while *Phyllosticta ricini* caused an areolate type of leaf spot in several experimental plots.

The 1st disease to be noted on white clover in Rhodesia was a leaf spot with symptoms of *Pseudoplea trifolii*. Several onion diseases were prevalent, including downy mildew [*Peronospora destructor*: map 76], bulb rot (*Fusarium* sp.), and smudge (*Colletotrichum circinans*). *Stemphylium botryosum* [*Pleospora herbarum*] was recorded for the 1st time causing damping-off of seedlings.

When 26 stem rust (*Puccinia graminis*) collections were tested on standard differentials, race 21 was identified in those from summer wheat at Salisbury and Sinoia, race 34 from the 1957 winter crop in Salisbury, and race ? 17 on the same winter crop at Sabi Station.

No improvement in the control of potato late blight [*Phytophthora infestans*] was obtained by adding a proprietary adhesive to mixtures containing 0·2% zineb and 0·3% Cu oxychloride. Control was better when both leaf surfaces were sprayed.

Tests demonstrated that *Elsinoe phaseoli* f.sp. *vulgare* can be seed-borne on beans [*Phaseolus vulgaris*: **38**, 296], both within the seed coat and on the surface, and can be carried in infected pod trash. When 10 French bean vars. were tested for resistance to scab and to 3 isolates of anthracnose (*C. lindemuthianum*), Wade and Selection 6-34-9 proved completely resistant to both, Burpee's Stringless highly susceptible to both, and Topcrop resistant to anthracnose and very susceptible to scab. Maneb at 2 lb. 100 gal. at 50% pod-set gave the best results of 4 fungicides tested.

Leaf spot (*Cercospora* [*Mycosphaerella*] *arachidicola*) on Virginia Bunch and Valencia type groundnuts was successfully controlled by 3 applications of dusting S, with a 12% increase in yield [cf. **38**, 564].

Pyne (C. T.). **Plant pathology section.** *Rep. Dep. Agric. S. Leone, 1957*, pp. 28–29, 1959.

The highest incidence of black pod (*Phytophthora palmivora*) [cf. **37**, 442] on cacao was at Magbema (Gaura), where 20% of the trees bore an av. of 3 diseased pods each. Applied at intervals of 1–4 weeks, 1% carbide Bordeaux proved more effective against the disease than either perepod or kopapod.

Banana leaf spot (*Mycosphaerella musicola*) was noted in Port Loko and Kambia, though not severe enough to cause death or appreciable loss in yield.

A fairly severe outbreak of false smut (*Ustilaginoidea virens*) was reported in Nov. on some rice vars. at the Kontobe experimental site; Parn, India Pa Lil, and Nash were not affected.

Misra (A. P.). **Plant diseases in Andaman Islands and their control.** *Plant Prot. Bull., New Delhi*, **8** (*1956*), 2, pp. 13–17, 1959.

This paper lists, with notes on climate, crops, and incidence, the major diseases and

pests of crops in the Andaman Is., including *Helminthosporium oryzae* [map 92] and *Ustilaginoidea virens* [map 347] on rice, *Glomerella tucumanensis* [map 186] and *Puccinia kuehnii* [map 215] on sugarcane, *P. purpurea* [map 212] (severe) on sorghum, *Sclerotium rolfsii* [map 311] on capsicum, *Alternaria solani* [map 89] on eggplant, *Corticium salmonicolor* [map 122] on rubber, *Hemileia vastatrix* [map 5] on coffee, and *Xanthomonas citri* [map 11] on citrus.

Resultados obtidos das experiências realizadas no campo de ensaios da secção de Patologia Vegetal em 1958. [Results obtained from experiments performed in the experimental field of the Division of Plant Pathology in 1958.]—*Gaz. Agric. Moçamb.*, **11**, 122, pp. 201–203, 1959.

Dithane Z-78 at 200 g./100 l. was the only one of 3 fungicides to give effective control of *Alternaria solani* on potato in Mozambique in this series of trials [cf. **36**. 540], increasing the value of the crop from $51,660 to 76.566 ha. Applied at 10-day intervals beginning when the plants reached a height of 20 cm., it reduced the incidence of *U[romyces] fabae* on broad bean by some 80%.

Umbreit (W. W.) (Editor.) **Advances in applied microbiology. Vol. I.** xi + 304 pp., New York and London, Academic Press, 1959. $9.50.

This publication aims to provide the practical microbiologist with a digest of current research. Among the 11 reviews contained in it are those by M. Herold & J. Nečásek (pp. 1–21) on 'Protected fermentation'; A. L. Demain (pp. 23–47), 'The mechanism of penicillin biosynthesis'; W. D. Bellamy (pp. 49–73), 'Preservation of food and drugs by ionizing radiation'; D. Pramer (pp. 75–85), 'The status of antibiotics in plant disease control'; S. R. Dutky (pp. 175–200), 'Insect microbiology', with a section on fungus diseases; and R. F. Robinson & R. S. Davidson (pp. 261–278), 'The large-scale growth of higher fungi'. Each paper is provided with an ample bibliography, and there are author and subject indexes.

Blanchard (J. R.) & Ostvold (H.). **Literature of agricultural research.** x + 231 pp., University of California Press, Berkeley and Los Angeles, 1958.

This list of publications is grouped under: general; plant, animal, and physical sciences; food and nutrition; and social sciences. Each section is subdivided, plant pathology being dealt with on pp. 49–55 (40 entries) and pest control on pp. 114–118 (26 entries). In each subdivision the literature is listed according to the type of publication.

Zemědělská fytopatologie, I. [Agricultural phytopathology, I.] 704 pp., 4 col. pl., 236 fig., 1 diag., 2 graphs, Prague, Czechoslovak Academy of Agricultural Sciences and State Agricultural Publishers, 1959. Kčs. 56. [66 pp. ref.]

In this volume [cf. **38**, 383] the preface and introduction (pp. 15–23) are by E. Baudyš *et al.* [cf. **10**, 121]; a section on physiological diseases (pp. 26–63) is by V. Voříšek; 7 contributions constitute a section (pp. 66–395) on the different groups of pathogens by B. Kvíčala, F. Mráz, V. Vacek, J. Špaček, A. Vězda, & F. Kühn; 2 chapters on symptomatology and disease control are by J. B. Novák (pp. 398–458; 460–503) supplemented by a chapter on fungicides by K. Dvořák (pp. 504–519); an introduction to phytopathological technique is by J. Benada *et al.* (pp. 522–628), and to the study of literature and the conduct of experiments by Z. Šesták (pp. 630–655); and a survey of sources of information, including bibliographies, herbaria, etc., is given by V. Skalický (pp. 656–676). Each chapter has numerous references, and there is a general index.

Moore (W. C.). **British parasitic fungi.** xvi + 430 pp., 1 map, Cambridge University Press, 1959. 45*s*.

This valuable reference work provides a guide to all the pathogenic fungi reported

on cultivated plants in Great Britain, the diseases caused by them, and the relevant literature published in Britain. The 1st part of the book (pp. 3–47) comprises an alphabetical list of hosts, each with an alphabetical list of fungus pathogens. In the 2nd part (pp. 51–430) the parasites are listed alphabetically, each with a reference to the original description and to the Latin diagnosis in Saccardo's *Sylloge Fungorum*, together with well-known synonyms and imperfect states; annotated references to important papers by British authors are included, and the diseases caused are enumerated, with notes on prevalence and distribution. The fungi that invade mushroom beds, certain myxomycetes, and a few actinomycetes are also treated.

Goto (M.) & Okabe (N.). **Bacterial plant diseases in Japan IX. 1. Bacterial stem rot of Pea. 2. Halo blight of Bean. 3. Bacterial spot of Physalis plant.**—*Rep. Fac. Agric. Shizuoka Univ.* 8, pp. 33–49, 1958.

In continuation of this series [cf. **37**, 208] it is reported that bacterial stem rot of pea, caused by *Xanthomonas pisi* Goto & Okabe, *Pseudomonas marginalis*, and *Erwinia carotovora* str. *aroideae* [*E. aroideae*] starts as water-soaked, dark-greenish spots or streaks on stipules, stems, petioles, and leaves, which either enlarge and cause the collapse of the young plants in favourable conditions, or remain as dark brown lesions under dry conditions. The wide host range of *X. pisi* and its ability to cause soft rot are its distinctive features.

Halo blight (*Pseudomonas phaseolicola*) [map 85] of kidney bean [*Phaseolus vulgaris*] was found for the first time in Japan.

Leaf spot of *Physalis alkekengi* var. *francheti*, characterized by small, angular, deep brown spots with a yellowish halo, was caused by *X. physalidicola* Goto & Okabe, similar to *X. vesicatoria*, except for its non-motility and its inability to ferment lactose and to attack tomato and capsicum. *X. vesicatoria* failed to attack *P. alkekengi*.

Klement (Z.). **Some new specific bacteriophages for plant pathogenic Xanthomonas spp.**—*Nature, Lond.*, **184**, 4694, pp. 1248–1249, 1959.

In further experiments at the Res. Inst. for Plant Protection, Budapest [cf. **38**, 727], a phage isolated from the leaves and inflorescences of carrot infected by *Xanthomonas carotae* [**36**, 745] formed plaques 1–2 mm. diam. and proved highly specific for this sp. Also found were 2 different phages on tomato and *Capsicum annuum*, respectively, specific for *X. vesicatoria*, widespread in Hungary [map 269], one forming plaques 1·5–2 mm., the other 1–3 mm. diam. Both were ineffective against 19 other *X.* spp. The isolation of these 2 phages confirms the existence of distinct vars. of *X. vesicatoria* on tomato and *C. annuum* [cf. **21**, 52; **36**, 734].

Paton (A. M.). **Enhancement of pigment production by Pseudomonas.** –*Nature, Lond.*, **184**, 4694, p. 1254, 1 graph, 1959.

Details are given of the liquid and solid media used at the Bact. Dept, Univ. Aberdeen, to stimulate fluorescent pigment production by *Pseudomonas* spp. One containing K or Na gluconate proved satisfactory and an ultra-violet light source was used to detect pigment not visible to the naked eye.

Annual Report of the Colonial Pesticides Research Unit, Arusha, Tanganyika, East Africa, for 1958–1959. (Progress Report No. 24.) 28 pp., 4 pl., 7 graphs, 1959. 5*s*.

In the sections dealing with fungicides and herbicides (pp. 18–20) are reported tests on the persistence of a Cu fungicide on coffee leaves. Cu oxychloride wettable powder was applied at 2·5 lb. Cu/100 gal./acre to single-stem coffee with a Pest-master sprayer. The initial levels of deposit on the 2 leaf surfaces were approx. equal, and their mean value corresponded closely to the mean over-all value (62

mg. of Cu/sq. m. on the 1st application). The persistence figures obtained after the 2nd application 2 months later (Nov.-Jan. rainfall 6 in.) were analysed statistically. It was found that the values for the initial deposit were similar, but the regression coefficients for rates of Cu loss from the upper and lower surface were significantly different and indicated a much greater rate of loss from the former. There was no evidence to show that Cu on the upper surface is transferred to the lower by weathering. In the months immediately before the long rains the value of frequent applications of Cu became apparent in improved leaf retention and a complete absence of rust (*Hemileia* [*vastatrix*]).

In tests in E. Africa of the dusting of coffee by an electrostatic machine [cf. **39**, 209], increased over-all deposits from charged Cu dusts were noted on the front of the rows of trees nearest the machine, but not on more distant rows; there was no evidence that the deposit on the lower surface was increased over that on the upper surface.

Investigations are in progress at Ibadan, Nigeria [**38**, 681], into the chemical control of cacao black pod (*Phytophthora palmivora*), including (1) the development of a technique for inoculating the pods; (2) tests of pre-inoculation application of fungicides; (3) the weathering properties of fungicidal deposits applied at different rates and with different droplet sizes in natural and artificial conditions; and (4) the effectiveness of weathered deposits in preventing infection. A biological laboratory method of assessing various levels and forms of fungicidal deposits has been devised. Treated pods are sprayed with a suspension of zoospores in distilled water. An approximately linear dosage/response curve is obtained when the number of lesions developing on treated pods, expressed as a percentage of those on the untreated, is plotted against surface deposit on log probit paper. A commercial fungicide containing cuprous oxide serves as a standard, and with this the median toxic deposit is 0·15 μg. Cu/sq. cm.

An experiment in co-operation with the Tea Research Institute was begun at Kericho, Kenya, in May 1958, in which *Grevillea robusta* trees (used as windbreaks or to provide shade) were treated with various arboricides against *Armillaria mellea*. The work is still in progress.

Cappellini (R. A.). **Hay molds and the fungitoxicity of 2,4,6-trichorophenol.**—*Mem. Cornell agric. Exp. Sta.* 359, 27 pp., 7 graphs, 1959. [55 ref.]

A more detailed account of this work [**36**, 649] is given. In slide germination tests with spore suspensions of *Penicillium cyclopium*, *P. stoloniferum*, *Aspergillus niger*, *A. ochraceus*, *A. repens*, *A. sydowii*, *A. versicolor*, *Cladosporium herbarum*, *Rhizopus nigricans* [*R. stolonifer*], and *Alternaria tenuis*, the concs. of trichlorophenol [cf. **30**, 233] required for approx. 100% inhibition of spore germination were in the range 88·5–250 p.p.m. Dosage response was linear (D-R curves from 1·8–17·9) with all spp. except *A. tenuis*, which gave a concave ('J'-type) curve.

In manometric studies the endogenous respiration of spores of some of these fungi, incubated with trichlorophenol at various concs., was stimulated to 168–583% that in controls at the low concs. (10^{-4}–5×10^{-4} M), while at high concs. (10^{-3}–$2{\cdot}5\times10^{-3}$ M) it was inhibited. This suggests inhibition of oxidative phosphorylation. There was approx. 50% inhibition of catalase activity in spores of *P. cyclopium* at $1{\cdot}25\times10^{-3}$ M.

Tolba (M. K.) & Saleh (A. M.). **The fungicidal action of mercuric chloride.**—*Proc. Iraqi sci. Soc.*, **2**, pp. 25–36, 1958. [Abs. in *Chem. Abstr.*, **53**, 20, col. 19269 a, 1959.]

Added to the mycelial mat of *Fusarium culmorum* in pure culture, $HgCl_2$ caused a marked fall in respiration, a reduction in the uptake of inorganic N, and a decrease in the protein and soluble N contents. These effects were counteracted by glutathione or cysteine and intensified by methionine.

Eckstein (S.) & Czerwińska (Elżbieta). **O własnościach i czynności grzybobójczej kwasów aryloksyacetohydroksamowych. II. Wpływ bromu jako podstawnika.** [The fungicidal properties and activity of aryloxyacetohydroxamic acids. II. The influence of bromine as a base.] *Przem. chem.*, **38**, 4, pp. 213–216, 1959. [Russ., Engl. summ. 13 ref.]

Further work at the Warsaw Polytechnic [cf. **38**, 349] involved the conversion of several ethyl esters of phenoxyacetic acids containing 1 or more Br atoms in the benzene ring into hydroxamic acid by means of excess hydroxylamine in methanol solution and their examination for activity against *Alternaria tenuis*, *Fusarium culmorum*, and *Rhizoctonia* [*Corticium*] *solani*. Fungitoxicity was found to be virtually confined to monosubstituted compounds, the introduction of the 2nd atom of Br, especially in the 2 or 6 positions, causing a reduction while the substitution of 3 atoms in the same positions made the compounds innocuous.

Casarini (B.), Cano (F.), & Martelli (R.). **Nuovi fungicidi a base di fenoli nitrati.** [New fungicides based on nitrophenols.]—*Ann. Sper. agr.*, N.S., **13**, 4, *Suppl.*, pp. I–IX, 1959. [Engl. summ.]

The results are presented of field tests conducted in 2 localities near Modena, in which mononitro-, dinitro-, and mixtures of mono- and dinitro-esterified alkylphenols were tested against *Oidium* on tobacco [*Erysiphe cichoracearum*: cf. **37**, 376] and vine [*Uncinula necator*: cf. **38**, 124]. As alkylating agents, 8–9 C radicals with straight and branched chains were used. Promising results in comparison with karathane were given by the butyric and crotonic esters. While the use of mononitro compounds against *U. necator* may be justified, on tobacco it seems necessary to employ compounds with a higher degree of nitration, or even to have recourse to dinitro compounds. The work is to be continued.

Liljedahl (L. A.) & Strait (J.). **Spray deposits measured rapidly.**—*Agric. Engng, St. Joseph, Mich.*, **40**, 6, pp. 332–335, 2 fig., 2 diag., 4 graphs, 1959. [19 ref.]

At Minnesota agric. Exp. Sta. the measurement of the fluorescence of spray deposited across the swath of a sprayer was found to be a good indication of the actual distribution of the spray, especially from broadcast and aircraft equipment. By the use of 2 chemicals fluorescing at different wave-lengths and appropriate filters it should be possible to extend the procedure to 'double-boom' experiments. The chemicals used in these trials were β-methyl umbelliferone (4-methyl-7-hydroxycoumarin) and Lumogen L light yellow (Nova Chemical Company) with a Wratten No. 9 filter.

The fluorescence of the deposit on paper of a spray containing a suspension of a fluorescent material is linearly proportional to the amount of chemical deposited, with max. inaccuracies under adverse test conditions of a probable order of 10%. Large droplets (diam. 2,500 μ) were somewhat less fluorescent than smaller ones, but the effect of this disparity was not apparent in a field test of a sprayer.

Reddy (C. S.) & Davide (R. G.). **Stickers for fungicidal sprays in the tropics.**—*Plant Dis. Reptr*, **43**, 8, pp. 872–877, 8 graphs, 1959.

In studies at Iowa State Coll., Ames, and U.S. Coll. of Agric., Laguna, Philippines, the measurement of spray residues on glass slides was facilitated by adding 1 ml. dilute solution of I-stained starch grains to each 400 ml. spray; slides held at an angle of 45° were sprayed to run-off, dried, and the grains counted under the low power. Counts made after each of a series of artificial 'rains' indicated that the sticker dosages generally recommended are too low for the tropics [cf. **38**, 598]. The best and cheapest sticker, as judged after 6 artificial rains, was natural rubber latex, which in a little ammonia water may be used at $\frac{1}{4}$ oz./gal. if strained to remove

debris liable to clog nozzles. Of 9 synthetic stickers tested PEPS (polyethylene polysulphide) [loc. cit.] was nearly as effective.

Berkhouwer (P.). **De planteziekten- en onkruidbestrijding in zuidelijk Noord-Holland.** [Plant disease and weed control in southern North Holland.]—*Landbouwvoorlichting*, **16**, 11, pp. 611–615, 2 fig., 1959.

An informative survey of important developments in chemotherapy since 1945 over an area of 25,000 ha. situated south of the Alkmaar-Hoorn line, including observations, e.g. on the encouraging results of the phytopathological warning service and on co-operative spraying.

Goldblatt (L. A.), Hopper (L. L.), & Mayne (Ruth V.). **Surface coating vehicles with built-in fungistats.** *Paint Varn. Prod.*, **49**, 8, pp. 44–46, 85, 1959. [*Chem. Abstr.*, **53**, 21, col. 20835 b, 1959.]

At the Southern Regional Res. Lab., New Orleans, La, some of a series of vehicles made from tung oil and propionic, undecylenic, and sorbic acids were found to possess fungistatic properties. For instance, a tung oil-tripropionic experimental paint proved superior to other coatings tested on a wooden fence facing south at 45° C.

Green (G. H.). **Mould-proofing of leather : a comparison of methods for evaluating mould resistance.**—*J. Soc. Leath. Tr. Chem.*, **43**, 9, pp. 212–220, 1959. [11 ref.]

Published methods are reviewed and a report is presented on the comparison at the Brit. Leather Manuf. Res. Ass., Milton Park, Egham, Surrey, of 3 inoculation procedures [cf. **31**, 74], using the fungicides *o*-phenyl phenol, pentachlorophenol, β-naphthol, and phenyl mercuric borate. A new and more exacting method is proposed in which each sample is inoculated by gentle pressure of both surfaces against untreated mouldy leather and then stored over 0·4% NaOH solution in separate containers. Inoculation is repeated at fortnightly intervals. Besides measuring stability the new technique permits a rough comparison of volatility to be made.

No Pitsch (M.) & Möbus (E.). **Besitzt der Schimmelpilz Aspergillus niger zellulosezerstörende Eigenschaften?** [Does the mould *A. niger* possess cellulose-destroying properties?] –*Melliand-Textilber.*, **40**, 6, pp. 677–680, 5 fig., 1 graph, 1959. [Engl., Fr., and Span. summ.]

At the Forschungsinstitut Hohenstein [cf. **38**, 477] 7 isolates of *Aspergillus niger* were inoculated into cotton and linen (1) unfinished, (2) finished with 70 g. wheat starch, 20 g. potato starch, 30 g. china clay, and 5 g. talc l., and (3) finished with the moisture-repellent ramasit WF Conc. Half the samples were steam-sterilized at 100° C. for 1 hr. on 3 successive days.

With the exception of 1 isolate (from Baarn), which did not thrive on the mineral-dextrose agar used, all the isolates were considerably destructive to the linen samples, frequently causing 100% loss in breaking strength. The most copious producer of cellulase was an isolate from the American Type Culture Collection, which reduced the breaking strength even of the impregnated samples of linen and cotton (which was generally more resistant) by 100 and 41%, respectively; another powerful strain was from Italy (100 and 28%, respectively). Isolates from Spain and Switzerland were generally weaker, though the latter caused 70% loss of breaking strength in impregnated linen.

Simpson (Marion E.) & Marsh (P. B.). **The decomposition of cellulose in Cotton fibre by the black Aspergilli.**—*Plant Dis. Reptr*, **43**, 9, pp. 1042–1047, 12 graphs, 1959.

Studies at the U.S. Dept Agric., Beltsville, Md, with *Aspergillus niger*, hitherto believed to be a non-cellulose-decomposing organism [**30**, 483], showed that

decomposition does occur if a small amount of glucose is added to the cellulose. The fungus was incubated with strips of unbleached cotton fabric on a mineral salt agar [Marsh *et al.*, **28**, 485] −glucose. With the addition of 0·5% glucose there was an average of 35% loss in breaking strength in 2 weeks. The degree of swelling of fibres from the strips in conc. alkali increased during incubation. When several of the related black Aspergilli were tested over a range of glucose conc., the changes in alkali-swelling for any isolate generally paralleled the strength losses, but alkali-centrifuge values were found to be the more sensitive of the 2 criteria. Isolates of *A. luchuensis* caused strength loss in the absence of added glucose [**27**, 486].

Peyronel (B.) & Fassi (B.). **Micorrize ectotrofiche in una Cesalpiniacea del Congo belga.** [Ectotrophic mycorrhiza in one of the Caesalpiniaceae in the Belgian Congo.]—Reprinted from *Atti Accad. Torino*, **91** (*1956 7*), 8 pp., 1957. [Fr. summ. Received Sept. 1958.]

A brief description is given of 5 different kinds of ectotrophic mycorrhiza found in *Gilbertiodendron dewevrei*, this being the 1st record of ectotrophic mycorrhiza in a legume. The endotrophic type was occasionally found.

Seo (J. S.). **A study of cellulase production by certain fungi.** *Diss. Abstr.*, **20**, 2, p. 460, 1959.

A study at Syracuse Univ. showed that the cellulases of *Myrothecium verrucaria* [**37**, 23; **38**, 61], *Polyporus palustris*, and *Trichoderma viride* [cf. **38**, 499] appear to be relatively stable extracellular enzymes which can be stored for several months at 4° C. with no apparent loss of activity. Each was active over a rather wide range of temp. and pH. All 3 fungi produced cellulase best in an initially acid medium. Trace quantities of various elements other than the usual minerals appeared to be important in cellulase production.

In the 3 fungi cellulase appears to be an adaptive enzyme, produced in measurable quantities on a cellulosic substrate, but not in media lacking cellulose.

Oku (H.). **Biochemical studies on Cochliobolus miyabeanus (S. Ito et Kurib.) Drechsler ex Dastur. II. Enzymes concerning amino acid utilization. (Part 1) On the amino acid oxidase.** *Forsch. PflKr., Kyoto*, **6**, 3, pp. 104–108, 2 graphs, 1959.

At the Takamine Lab., Sankyo Co. Ltd., Shinagawa, Tokyo, D-amino acid oxidase was highly active in *C. miyabeanus* [**37**, 55], while its L-form was absent. The opt. pH value of the enzyme obtained from acetone-dried mycelium was 10·5; it was not destroyed by drying, and was completely inhibited by 0·01 M 2,4-dinitrophenol, but not by KCN; benzoate did not inhibit it significantly.

Hirata (S.). **Studies on the phytohormone in the malformed portion of the diseased plants. 5. On the auxin formation by Protomyces fungi.** *Ann. phytopath. Soc. Japan*, **23**, 3, pp. 145–149, 3 graphs, 1958. [Jap. Abs. from Engl. summ.]

In further studies [**38**, 244] at Univ. Miyazaki, *P. inouyei*, parasitic on *Youngia japonica*, and 2 other *P.* spp. from other hosts were shown to produce indole acetic acid (I.A.A.) on Czapek's solution with tryptophane instead of KNO_3, but not on standard Czapek. Chromatographic bioassay showed that the I.A.A. metabolic production from tryptophane in the 3 *P.* spp. was lower than in *Ustilago*, *Taphrina*, *Exobasidium*, *Fusarium* and other spp. studied by the author [loc. cit.].

Hilpert (F.). **Einfluß niederer relativer Dampfspannung auf Streptomyceten.** [Influence of low relative vapour tension on streptomycetes.]—*Naturwissenschaften*, **46**, 22, p. 630, 1959.

At the Wissenschaftliche Laboratorien des VEB Jenapharm, Jena, Germany,

under Burcik's method (*Arch. Mikrobiol.*, **26**, 175, 1950) in a slightly modified form, strain 1 of *Streptomyces rimosus* was unable to germinate on 2 media, differing principally in their carbohydrate sources—saccharose and oatmeal in 1 and potato starch in the other at R.H. below 100%, whereas strain 2 could do so at 88%. On potato starch only, however, strain 2, at and below 95·4%, exhibited distinct shortening and increased branching of the aerial hyphae, the tips of which were about 3 times thicker than normal. Similar observations were made by Jagnow [**36**, 726]. These strongly refringent swellings represent layers of mucilage which envelop the cell wall like a mantle. The same phenomenon has been observed by the writer in *S. griseus* and in various actinomycetes by others [*Z. physiol. Chem.*, **292**, 77, 1953; *Arch. Mikrobiol.*, **29**, 90, 1958].

Clark (R. S.), Kuć (J.), Henze (R. E.), & Quackenbush (F. W.). **The nature and fungitoxicity of an amino acid addition product of chlorogenic acid.**—*Phytopathology*, **49**, 9, pp. 594–597, 1959.

In further studies at Purdue Univ., Lafayette, Ind. [cf. **37**, 305], this product, separated chromatographically from extracts of Russet and Netted Gem potato peel, proved highly toxic to *Helminthosporium carbonum* race 1 [**36**, 48]. In aqueous or alcoholic solutions it yielded chlorogenic acid and caffeic acid together with isoleucine, methionine, phenylalanine, tryptophane, tyrosine, valine, and 2 other unidentified ninhydrin-reacting substances. As the product breaks down, its inhibitory activity in solution towards *H. carbonum* decreases markedly. Quinone formation (measured by the KI-starch test) becomes evident in 72 hr. in aqueous or alcoholic solution at pH 4–4·5 and in 10 min. at 5·5 or higher.

Menon (S. K.). **Antibiotics and plant disease control.**—*Bull. Hindust. Antib.*, **1**, 4, pp. 107–110, 1959.

A review of the use of antibiotics for the control of bacterial, fungal, and virus diseases of crop plants. The application of the better known compounds and formulations is illustrated by examples. Transport of antibiotics in plants and their mode of action are briefly considered.

Vernon (T. R.) & Dye (M. H.). **A broad-spectrum antibiotic produced by a white-spored streptomycete (Albus group) isolated from New Zealand soil.** *N.Z.J. agric. Res.*, **2**, 5, pp. 982–989, 3 fig., 2 graphs, 1959.

A description from the D.S.I.R., Auckland, of morphological, cultural, and physiological features of the organism, particulars of fermentation procedures for the production of an antibiotic active against both Gram+ and Gram− bacteria, and characteristics of the antibacterial spectra of crude culture filtrates and of the partly purified antibiotic are presented.

Lawrence (D. B.). **The fungi on deglaciated Alaskan terrain of known age.**—*Res. Stud. Wash. St. Univ.* (formerly *St. Coll. Wash.*), **27**, 3, pp. 110–128, 1 map, 1959.

Cooke (W. B.) & Lawrence (D. B.). **Soil mould fungi isolated from recently glaciated soils in south-eastern Alaska.**—*J. Ecol.*, **47**, 3, pp. 529–549, 1959.

The 1st paper summarizes the findings of a 1952 expedition for the study of the development of vegetation and soil in deglaciated terrain in S.E. Alaska, in which the fungi present and their roles in the death and decay of plants were investigated [cf. **34**, 789]. An attempt was made to collect all fungus spp. within a radius of 200 ft. from the sampling sites used by the soil specialist on the expedition.

In the Mendenhall Glacier area root rots, especially those associated with *Ophiobolus graminis*, were prevalent in such grasses as *Agrostis exarata* and *Festuca ovina*

var. *brachyphylla*. Among the parasitic fungi common on grasses was *Fusarium nivale* [*Calonectria nivalis*], also present on necrotic spruce seedlings.

At No. 3 station in this area *Puccinia recondita* was severe on *Trisetum spicatum*, and at station G. 8 *Rhytisma salicinum*, present in great quantities at other sites, caused spots on 37% of the leaves of *Salix sitchensis* in 1 sample and 31% in another. *S. alaxensis* was free from spots in this area. An unidentified *Salix* with bright green leaves and clasping petioles (? hybrid) had only 2% diseased leaves.

At Lawrence No. 3 station the cottonwoods (*Populus trichocarpa*) were heavily infected (78%) by *Melampsora occidentalis* and the leaves were falling prematurely. Mycorrhizal fungi were here much more in evidence in the rhizospheres of conifers. At Crocker No. 10 station *Vaccinium ovalifolium* carried leaf gall (*Exobasidium vaccinii*); about 6% of the blueberry leaves were infected in this area; in older forest communities, e.g. Crocker No. 14 Station it attacked 32% of the leaves. Here, too, conks of *Fomes applanatus* [*Ganoderma applanatum*] 12 in. in diam. were noted on dead, standing hemlocks (*Tsuga heterophylla*). Wherever man has interfered, conks are found on man-felled trees in comparatively young forests, but elsewhere they are rare, even in forests over 100 yr. old.

The authors of the 2nd paper planned a joint effort in the spring of 1955 to collect fresh soil material from developing communities of differing ages. They found that as the natural vascular plant communities mature and the N content of the soil increases the numbers and spp. of moulds (as determined by the soil plate dilution technique) increase. As the litter materials increase, the N fraction is used by a larger number of organisms in the presence of greater C supplies in the litter. As more coniferous litter becomes available agarics become competitive and the numbers of colonies of soil moulds decrease; some spp. may drop out while others may come in. As the vascular plant vegetation matures, more and more soil moulds are found in deeper layers of mineral soils.

The soil mould populations in the 2 areas studied (Glacier Bay and Mendenhall Glacier) are fairly homogeneous. With the techniques used, no special trend is shown of a particular horizon by a special fungus. The species found are listed.

Morrison (T. M.), Ross (D. Y.), & Thornton (R. H.). **Plant pathogenicity studies with non-sporing fungi from tussock-grassland soils.** *N.Z.J. agric. Res.*, **2**, 5, pp. 870–873, 1959.

At Taita exp. Sta., Lower Hutt, glasshouse inoculations demonstrated that the predominant fungi in tussock-grassland soils, viz. *Rhizoctonia* spp. [cf. **38**, 310], *R.* [*Corticium*] *solani*, and a sterile mycelium, were non-pathogenic to lettuce, radish, wheat, potato, and pine; nor did seedlings of *Pinus radiata* 10–12 cm. high form any mycorrhizal associations with these fungi.

Grossbard (Erna) & Stranks (D. R.). **Translocation of cobalt-60 and caesium-137 by fungi in agar and soil cultures.** *Nature, Lond.*, **184**, 4683, pp. 310–314, 3 fig., 1959.

In this extension of previous work [cf. **38**, 70] glass tubes containing sterile soil were inoculated with disks of radioactive agar culture mixed with soil, half of each disk being killed by heat beforehand, and each half placed at 1 end of the soil column. The tubes were immediately scanned with a directional scincillation counter with a collimator, which can locate with considerable accuracy the radioactive inoculum (mainly *Pellicularia filamentosa* [*Corticium solani*] and *Rhizopus stolonifer*) through the soil and glass. After 3 weeks no radioactivity was detected in the fresh mycelium penetrating the entire soil column.

Using a modification of Schutte's technique [**35**, 839], however, translocation of cobalt-60 was detected readily in agar culture in the individual fungal structures of phycomycetes but less easily in septate *Corticium*, which suggests that the fungi

tested have a translocation mechanism for the 2 nuclides in agar media; the absence of radioactivity in the new mycelium in soil from labelled inocula cannot be explained satisfactorily in terms of inherent lack of a translocation mechanism.

Golovin (P. N.). Понятие о виде в Микологии. [The concept of species in mycology.]— Пробл. Вида в Бот. I. [*ex* The problem of species in botany I.] Moscow-Leningrad, Academy of Sciences U.S.S.R., pp. 34–67, 1958. [36 ref.]

This paper is one of a series and contains sections on the characteristics of fungi, the unequal value of species, and consideration of the major groups.

According to the author [cf. **37**, 524] fungi are monophyletic in origin, evolutionary trends being determined by their heterotrophic nutrition. Their peculiar position in the plant world is due to the direct connexion between this evolutionary development and their nutritional requirements. There is frequently confusion between natural species and the species as an artificial taxonomic unit. The interrelationships of the concepts of parasitism and saprophytism in the evolutionary pattern and the species concept in large systematic subdivisions are analyzed.

Cummins (G. B.). **Illustrated genera of rust fungi.** - ii + 131 pp., 1 pl., 345 fig., Minneapolis, Burgess Publishing Company; London, Mayflower Publishing Company, 1959. 32*s*. [54 ref.]

This generously illustrated manual presents keys and descriptions of 95 genera of Uredinales. No families are recognized. Treatment departs somewhat from that of Dietel (*Die Naturlichen Pflanzenfamilien*, **6**, 1928) and Thirumalachar & Mundkur [**30**, 248]. Following a survey (pp. 1–12) of spore forms, life cycles, host relations, and taxonomic problems, a page is devoted to each genus, with description, type sp., brief notes, and illustrations, some of which are schematic diagrams serving for several genera, others are excellent reproductions of photographs illustrating salient features. A partial list of generic synonyms and a glossary of terms are appended.

Barr (Margaret E.). **Northern Pyrenomycetes. I. Canadian Eastern Arctic.**— *Contr. Inst. bot. Univ. Montreal* 73, 101 pp., 9 pl., 1959. [4 pp. ref.]

This paper treats the sphaeriaceous and dothideaceous forms previously recorded for the area and discovered during this study, with their known distribution. The material studied came from collections contributed by several botanists, supplemented by specimens in the Herbarium Marie-Victorin of Montreal Univ. A detailed description of each sp. (about 100 in all), a list of synonyms, and hosts are given.

Ellis (M. B.). **Clasterosporium and some allied Dematiaceae—Phragmosporae, I, II.**—*Mycol. Pap.* 70, 89 pp., 63 fig., 1958; 72, 75 pp., 58 fig., 1959.

Paper I is concerned with *Clasterosporium* (7 spp.), *Ceratophorum* (2 spp.), *Sporidesmium* (50 spp.), and *Annellophora* (4 spp.), with keys to the genera and spp. The 2nd paper treats *Bactrodesmium* (9 spp.), *Bactrodesmiella* gen. nov. (1 sp.), *Brachysporiella* (3 spp.), *Endophragmia* (11 spp.), and *Stigmina* (30 spp.). Amongst the new combinations proposed are *S. carpophila* for *Clasterosporium carpophilum* [map 188], *S. mangiferae* for *Cercospora mangiferae* [**39**, 120], *S. deflectens* for *Exosporium deflectens*, and *S. juniperina* for *Cercospora juniperina*; *S. glomerulosa* (Sacc.) Hughes, syn. *Clasterosporium glomerulosum*, is accepted; the last 3 spp. are all found on leaves of *Juniperus communis*.

Knox-Davies (P. S.). **The cytology and genetics of Helminthosporium turcicum and its ascigerous stage Trichometasphaeria turcica.** *Diss. Abstr.*, **20**, 3, p. 861, 1959.

Vegetative cells of the fungus, studied at Univ. Wis. [cf. **37**, 650; **38**, 511], were

almost invariably multinucleate. The most outstanding feature of nuclear division was that all the nuclei in a cell divided simultaneously. Conidiophores and conidia, both multinucleate throughout their development, were occasionally joined by wide cytoplasmic connexions. In a cross between a dark and an albino isolate, crozier formation was typical and nuclear fusion occurred in the young ascus. The cells of mature ascospores were multinucleate. It is suggested that aneuploidy is a common phenomenon in conidial *T. turcica*, and possibly in other imperfect fungi.

Buxton (E. W.). **Production of a perfect stage in a nutritionally deficient mutant of pathogenic Fusarium oxysporum after ultra-violet irradiation.** *Nature, Lond.*, **184**, 4694, p. 1258, 1959.

In further research at Rothamsted on the effect of ultra-violet radiation on pathogens [cf. **36**. 717] an isolate of *F. oxysporum* f. *pisi* [**38**. 652] was found deficient for methionine and arginine synthesis after the 1st irradiation in Oct. 1954, and additionally deficient in cystine and vitamin B_1 synthesis after the 2nd irradiation in June 1955. It could grow only slowly on non-supplemented agar media, though it retained its ability to wilt peas. In 1956 the mutant strain produced a few bright red perithecia, which not until Feb. 1959 developed asci, enabling it to be identified as *Nectria* (*Hypomyces*) *haematococca*.

Brook (P. J.). **A volumetric spore trap for sampling pastures.** *N.Z.J. agric. Res.*, **2**, 4, pp. 690–693, 3 fig., 1959.

Following the occurrence of facial eczema in sheep caused by *Sporidesmium bakeri* [cf. **37**. 351], a machine for sampling the spore population of pastures, where it occurs, was designed by the D.S.I.R. Auckland. The volumetric spore trap, a modification of Gregory's [**34**. 664], is on wheels, with rotating blades in front of the impactor orifice to throw up spores from the pasture. The spores are sucked into the impactor by a sliding-vane pump driven off the wheels. The impactor is adjustable vertically. A domestic model gas meter in the line between pump and impactor measures the air intake and also smooths the flow.

Cadman (C. H.) & Harrison (B. D.). **Studies on the properties of the soil-borne viruses of the Tobacco-rattle type occurring in Scotland.** *Ann. appl. Biol.*, **47**, 3, pp. 542–556, 1 pl. (10 fig.), 1959.

These studies at the Scot. hort. Res. Inst., Invergowrie, and at Rothamsted concerned 12 cultures (11 from Scotland—2 from potato with stem mottle disease—and 1 from potato in the Netherlands) of soil-borne viruses of the tobacco rattle type [str. of potato stem mottle virus: cf. **39**. 479, 650] common in Scotland, though often confined to plant roots and distinguished from other soil-borne viruses in Britain by their symptoms on tobacco, *Chenopodium amaranticolor*, and French bean (*Phaseolus vulgaris*). Some of the cultures (M types) multiplied readily and were easily transmitted by celite inoculation, while others (NM types) were thus transmitted only with difficulty, some were intermediate, behaviour which remained constant throughout 20 successive subcultures. There were only slight differences between the symptoms caused by the 2 types, and some single-lesion isolates from the M type behaved in all ways like NM types, the proportion differing according to the parent culture. Most single-lesion isolates from the M type caused different symptoms from the parent culture. All the M types tested, including the Dutch one, were serologically related, but different cultures, and different samples of the same culture propagated on different occasions, varied in antigenic constitution. Belladonna [*Atropa belladonna*] mosaic virus [cf. **22**, 451] is serologically related to tobacco rattle virus and should now be considered a str. of that virus. A virus associated with potato spraing [**38**, 708; **39**, 240] behaves like the NM types.

Infection with each of several M types, including the Dutch, protected *Nicotiana sylvestris* plants from the effects of each of the others. NM types also protected *N. sylvestris* from the effects of the Dutch culture, though it was later isolated from the tip leaves. Sap from plants infected with M cultures contained characteristic rod-shaped particles, which were not present in sap from plants infected with NM.

In tobacco sap M types had a thermal inactivation point of 80–85° C., a dilution end-point of 10^{-5}–10^{-6}, and a longevity in vitro $>$ 6 weeks; infectivity survived freezing and precipitation by ammonium sulphate, but not pH 3. In many of its properties (including failure to show photo-reactivation after ultra-violet irradiation) tobacco rattle virus resembled tobacco mosaic virus.

Soil-borne viruses found in Britain fall into 3 groups, tobacco necrosis, tomato black ring [cf. **38**, 268], and tobacco rattle, the variability of the viruses of the last-named type being their most interesting quality.

Yarwood (C. E.). **Virus susceptibility increased by soaking Bean leaves in water.**—*Plant Dis. Reptr*, **43**, 8, pp. 841–844, 1 graph, 1959.

At the Univ. Calif., Berkeley, immersion of the primary leaves of Pinto bean (*Phaseolus vulgaris*) in water [cf. **35**, 865] before inoculation with tobacco mosaic virus, tobacco necrosis virus, peach yellow bud mosaic virus, or apple mosaic virus [**35**, 902] increased the number of resultant lesions. With immersion from 4–8 p.m. susceptibility fell for 14 hr. but then increased markedly over the untreated. Max. increase (13-fold) was obtained by inoculation at 4–5 a.m. of leaves previously in water for 34 hr. The response to soaking was less when inoculum was suspended in 1% K_2HPO_4 than when it was applied in water. Water soaking of cucumber cotyledons did not increase their susceptibility to peach ring spot virus.

Panzer (J. D.). **The effect of humidity and atmospheric pressure on virus infection of local lesion hosts.**—*Plant Dis. Reptr*, **43**, 8, pp. 845–848, 1 fig., 1 graph, 1959.

In further studies at S. Dakota State Coll., Brookings [cf. **38**, 249], local lesion development on *Nicotiana glutinosa* infected by tobacco mosaic virus and Bountiful and Yelloweye beans (*Phaseolus vulgaris*) by lucerne mosaic virus was reduced when leaves or shoots were kept at high humidity ($< 98\%$) after inoculation; low humidity (9–13%) had a similar effect on bean infection, though not on *N. glutinosa*. Immersion of the plants used in water [cf. above] after inoculation limited the number of lesions on bean and there were none on *N. glutinosa*. Variation in atmospheric pressure after inoculation had no effect.

Labaw (L. W.). **An electron microscopic determination of the Rothamsted Tobacco necrosis protein crystal structure.**

Labaw (L. W.) & Wyckoff (R. W. G.). **The electron microscopy of Tobacco necrosis virus crystals.**—*J. ultrastruct. Res.*, **3**, 1, pp. 8–15, 6 fig., 1959; pp. 58–69, 4 fig., 1 diag., 1959.

These two papers from the nat. Inst. Health, Bethesda, Md. include a series of most striking electron micrographs depicting shadowed replicas of the octahedral and rhombic crystals of tobacco necrosis virus at magnifications of $\times$53,500–190,000.

Hutchins (L. M.). **Current surveys for cushion gall.** Ex *Proc. 7th Interamer. Cacao Conf., 1958*, 9 pp., 1958. [Reprinted in *J. agric. Soc. Trin. Tob.*, **59**, 3, p. 325, alternate pp. to p. 340, 1959.]

Hutchins (L. M.). **Report on Cushion gall of Cacao in Nicaragua. Cushion gall of Cacao and disease-free propagating material. Cushion gall of Cacao in Guatemala.**—*Rep. Inter-Amer. Inst. agric. Sci., Turrialba*, 29, 4 pp.; 31, 9 pp.; 34, 8 pp., 1958. (Span. translations published as *Inf. Inter-Amer. Inst. agric. Sci.* 29-E, 31-E, 34-E.)

Hutchins (L. M.), Desrosiers (R.), & Martin (E.). **Varietal susceptibility to flowery cushion gall of Cacao.**—*Ibid.* 33, 10 pp., 1 fig., 1959. (Span. translation *Inf.* 33-E.)

Hutchins (L. M.). **Transmission of cushion gall of Cacao by means of tissue transplantation.** *Comun. Turrialba* 66, 6 pp., 3 fig., 1959. [All cyclostyled.]

In this series of papers from Costa Rica, the author notes that in the western hemisphere cushion gall [**38**, 587; **39**, 97], first described in Colombia as 'Verruga del cojin floral' (C. O. Garcés, Enfermedades del Cacao en Colombia, 1940) and reported from Surinam (as 'yaws') [Van Suchtelen: **35**, 171], Costa Rica [**35**, 883], Nicaragua [**35**, 663], and Panama by 1951, has also been seen by him in Guatemala and Trinidad (though it has not yet assumed serious proportions), and the same disease or one closely allied has been seen in Mexico.

Attention is also drawn to a new virus-like disease of cacao at Turrialba and La Lola, Costa Rica, and described as 'cacao mosaic'. Symptoms include chlorotic spots and streaks, and a marked network of cleared veinlets in restricted areas of the leaf, which may be distorted. They are distinct from those of other reported cacao viruses [**39**, 96]. The disease is believed to be unrelated to cushion gall, though both have sometimes been found on the same tree.

Cushion galls, confined to flower cushions of affected trees, are usually dark brown and cauliflower-like in appearance and texture. First noticeable at $\frac{1}{3}$ in. diam., they develop rapidly, to 1–3 in. diam. and 1 in. thick in a growing season, and sometimes attain 4–6 in. diam. and 3–4 in. thick. Two types are distinguished, sometimes on the same tree: swollen flower cushions produce innumerable small, sessile, floral initials; in 'green-point' gall, the type most frequently described and illustrated, few or none of these develop a flower pedicel, the result being a profusion of fresh, green points on the verrucose, brown surface of the gall, which rarely produces a pod; in 'flowery' gall bud growth is not inhibited and flowers may develop in profusion, though very few pods are produced. The latter has been confused with the multifloral cushions of self-incompatible 'male' cacao [cf. Nowell: **3**, 50], but the two are readily distinguishable as they develop. Both 'green-point' and 'flowery' galls are semi-hard, and generally easily detached, the swollen part of the gall being superficial and borne on a central attachment $\frac{1}{4}$–$\frac{1}{2}$ in. diam. The inner tissues of the developing gall are light coloured, rather soft, and branch laterally and vertically from the 'stalk'. After a year or so the galls, particularly 'green-point', may die, the tissues becoming black and easily shattered.

Two other types of gall occur on flower cushions. 'Knob' galls are hard, woody, smooth-surfaced, 1 in. or more in diam., with no flowers; they are common, but occur sparsely on a tree and are unimportant. 'Hard flat' galls have been seen in quantity only on certain old trees in Guatemala and Brazil; they may attain 2–3 in. diam., have a flattish, corrugated, dark surface, may bear some flowers and fruits, and are in union with the surface of the parent limb throughout.

Report 33 gives details of the pronounced differences in clonal susceptibility to the 'flowery cushion' gall, which predominates in a varietal plot of the United Fruit Co. at Zent Farm, Costa Rica. The necessity of avoiding trees with any type of gall as a source of propagating material and of removing such trees where their numbers are few is stressed in these reports.

Report 29 [cf. **35**, 664] notes that over a period of years galls may affect the whole tree and almost eliminate pod production. In a plantation in western Nicaragua dating from 1880, partly abandoned some 40 yr. ago and recently rehabilitated by cutting back many of the old trees, some 44% of the old unpruned trees had cushion gall (known to have been present for 8–10 yr.); on cut back trees there was 19%, on cut back and budded 50%, and on seedlings, 10–35%. These figures indicate that the disease is infective and becomes systemic.

In July and Aug. 1959, in inoculations (143 in all) with 'green-point' gall tissue at Turrialba, by placing it onto or into freshly cut surfaces on gall-free trees, at or near the union of pod stalk and branch, 14 (9·7%) developed similar type galls on the pod stalk at intervals of 34–111 days. 'Flowery' gall inoculations have been ineffective so far.

Del Rosario (Maria S. E.). **Studies of Aceria tulipae Keifer (Eriophyidae) and other eriophyid mites in Kansas in relation to the transmission of Wheat streak mosaic virus.**—*Diss. Abstr.*, **20**, 3, pp. 863–864, 1959.

In further studies at Kansas State Univ. [**38**, 684], using *A. tulipae* from *A.* [? *Allium*] *smithii* and onions, the possibility that there might be strains of the vector and specific host relationships was indicated by the low percentages of infestation achieved on wheat by mites from *A. smithii* (1·9%) and from 'imported' onions (9·23%), the gall-like formations produced, and the variability of the different mites in transmitting the virus: those from *A. smithii* achieved 1·03%, those from 'selected' *A. smithii* 31·6%, those from imported onions 27·4%, and from local ones 55·9%, compared with 85–100% by mites from wheat.

Maize and green foxtail grass [*Alopecurus* sp.] may be substitute hosts for the virus and the mite during the summer, onion and *A. smithii* may be mite hosts, and lucerne a temporary or subsistent host. Five other eriophyid mite spp. from various hosts would not colonize wheat and did not transmit the virus. Eggs did not carry the virus and adults did not acquire it. Mites from diseased plants remained viruliferous for 18 days when placed on several culture media. The virus can be recovered from inoculated wheat plants by mites or manual transmission techniques 2 days after inoculation.

Basile (Rita), Leonori-Ossicini (Agnese), & Zitelli (Giuseppina). **Le razze fisiologiche di Puccinia recondita Rob. ex Desm. (= P. rubigo-vera (DC.) Wint. f.sp. tritici (Erikss.) Carl.) identificate durante l'anno 1957.** [The physiologic races of *P. recondita* identified during the year 1957.] *Ann. Sper. agr.*, N.S., **13**, 5, *Suppl.* pp. I–IV, 1959. [Engl. summ.]

In material from 29 different provinces in Italy 33 physiologic races of *P. recondita* [**38**, 686] were identified, the most virulent being 57 and 176. Tables give the arrangement of races in Johnston's unified groups, distribution according to frequency in the different areas, and the vars. and selections of wheat from which they were isolated.

Noulard (L.). **Note sur le comportement d'une collection de Froment de printemps vis-à-vis du charbon nu (Ustilago nuda tritici Schaf.).** [A note on the behaviour of a collection of spring Wheat towards loose smut (*U. nuda*).] *Parasitica*. **15**, 3, pp. 121–126, 1959.

From 1952–57 some 250 vars. of spring wheat were inoculated at the Station de Recherches de l'État pour l'Amélioration des Plantes de grande Culture, Gembloux, Belgium, with *U. nuda*. Over 90, from various countries, were completely resistant to the strs. of the fungus used (in 1952–3 the inoculum was obtained from the susceptible wheat vars. Alter and Précoce de Gembloux; later, it was taken from and multiplied on Alter or Alfy). Of the vars. grown in Belgium, Jufy I, Phoebus, and Blédauril were very resistant. The strs. used appeared to belong to weakly virulent races.

Kühnel (W.). **Der Einfluß der Faktoren Bodenart, Bodenfeuchtigkeit, und Bodentemperatur auf die Höhe des Steinbrandbefalls des Weizens.** [The influence of the factors soil type, soil moisture, and soil temperature on the level of bunt

infection in Wheat.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **13**, 5, pp. 81–91, 17 graphs, 1959. [Russ., Engl. summ.]

Field and laboratory experiments at the Biologischen Zentralanstalt, Berlin, showed that the effect of the 3 factors on *Tilletia caries* is complex, the influence of soil type on spore germination and infection varying according to moisture and temp. [cf. **37**, 153]. Conditions for infection are optimal at a low moisture level in loam and loamy sand, a moderate level in sand, and moderate to high in peat and compost. When the opt. temp. and moisture conditions for a given soil are attained then the nature of the soil itself is without recognizable influence. Moisture level at sowing is of decisive importance in determining the level of infection. In loam spore germination was best at 20–40% water capacity and 12 15°C.; for peat and compost the corresponding figures were 50–70% at 7 -13°, and for sand 50% at 13°. In time of sowing tests with winter wheat temp. was found to be less influential than soil moisture. Under glass high temp. during the germination and early development of spring wheat was not a limiting factor for infection. The susceptibility of a given var. depended on the soil conditions: Criewener 192, Derenburger Silber, and Bastard 2 were more susceptible on sand, and Hadmerslebener strain 4157/47 on loam.

Craddock (J. C.). **Inheritance of the Redman resistance to Tilletia caries (DC.) Tul. and T. foetida (Wallr.) Liro.** *Diss. Abstr.*, **20**, 3, p. 836, 1959.

At the State Coll. Wash., U.S.A., progenies from crosses of the bunt-resistant, hard, red spring wheat Redman (C.I. 12638) with the susceptible Elgin and resistant Orfed and Elmar were inoculated with 6 races of bunt, selected on the basis of (1) Redman, but not winter wheat, resistant; (2) winter wheat, but not Redman, resistant; (3) both parents resistant; and (4) both parents susceptible. The max. number of races inoculated in any one cross was 3. The results indicated that Redman has 3 factors for resistance, that to race L-4 being recessive, and that to T-1 dominant: resistance to L-4 is explainable in terms of one recessive and 2 complementary factors for resistance, with 1 dominant factor in Elgin being epistatic to each of the 2 dominant factors in Redman: resistance to races of *T. caries* was conditioned by 1 dominant factor for race T-1, and 2 incompletely dominant factors for T-6. Redman's susceptible reaction to races T-13, T-15, and T-16 was conditioned by recessive factors. None of the so-called major factors (Martin, Turkey, Rio [cf. **37**, 469]) was present in Redman.

Since some of the F_3 progeny exceeded the bunt reaction of the parents, transgressive inheritance was indicated. This could be of use in further increasing the resistance of winter wheat.

Frohberger (P. E.). **Studies on the question of the influence of seed treatment and water content of grain on latter's storage property.** *Höfchenbr. Bayer-PflSch. Nachr.*, Engl. Ed., **11**, 3, pp. 103–114, 1958.

In tests at the Biol. Inst. of Farbenfabriken Bayer A.G. Leverkusen, Germany, moist Carstens VI winter wheat seed was not storable, damage (reduction of germination and emergence) increasing proportionately to moisture content and storage time. Susceptibility to ceresan universal dry seed dressing was not influenced by moist storage. Proper pre-storage treatment tends to lessen damage from moisture, but overdoses are far less tolerated by wet seed than by dry. An exactly dosed treatment with ceresan before storage is recommended as a routine, even when the moisture content of the seed is uncertain.

Becker (A.). **On the question of storing treated and wet grain seed.**—*Höfchenbr. Bayer-PflSch. Nachr.*, Engl. Ed., **11**, 3, pp. 90–102, 3 fig., 1958.

This report from the Crop Protection Div., Chamber of Agric. (Rhineland), Bonn,

describes the treatment of normal dry rye, wheat, barley, and oat seed with ceresan [cf. above] in comparison with 3 commercial seed dressings all at 2 g./kg. in Nov. 1954; it was then stored in paper sacks in a dry and well-aired loft. After 6 months and 1 yr. germination and growth vigour compared favourably with untreated seed, though mercury-lindane products reduced the growth vigour of wheat somewhat.

In a 2nd series of tests in Oct. 1956 at Lommersum, to examine the effect of treatment on moist rye [**35**, 443] (Petkuser Normalstroh; water content 19·6–19·8%) stored for a lengthy period, this had a germination capacity of 60% and was no longer suitable as seed. The different seed dressings and insecticides used had no adverse effect on germination and growth vigour of this unusually moist seed, even when stored in sacks for several weeks in a well-aired room. Even the slight addition of 1% water to bind the seed dressing dust had no adverse effect. Nevertheless it is aimed to secure a moisture content of under 16% in seed to be treated. During the testing period no appreciable differences in water content were established for treated and stored rye. By adding 1% water during the treatment operation, the moisture content of the rye was increased by an av. of 0·5%.

In a field test in Nov. 1956 at Buschdorf near Bonn emergence of rye was delayed considerably by an early cold spell. At first there were no great differences in crop density, but towards the end of the winter season they were striking. In Mar. 1957 there were not half as many plants in the untreated plots as in those with dressed seed. One plot treated with morkit had a particularly good crop, and another, sown with moist grain dressed with mercury-lindane products and stored for 6 weeks, did well. Dressing gave good protection against *Fusarium* infection, which was very severe in 1956. Later the differences lessened appreciably as tillering became vigorous.

The author concludes that dressed grain can be stored for a lengthy period without affecting the germinating capacity and growth vigour; grain with a high moisture content should be dried before storage; and it is most advisable to sow the seed immediately after treatment.

Nover (Ilse) & Mansfeld (R.). **Resistenzeigenschaften im Gersten- und Weizensortiment Gatersleben. 3. Prüfung der Gersten auf ihr Verhalten gegen Zwergrost (Puccinia hordei Otth).** [Resistance in the Gatersleben Barley and Wheat collection. 3. Testing of Barleys for reaction to dwarf rust (*P. hordei*).]—*Kulturpflanze* (*Ber. Inst. Kulturpfl Forsch.*), **7**, pp. 29–36, 1959.

In further studies [cf. **36**, 312] at the Phytopathologischen Inst., Halle-Wittenberg, and the Inst. für Kulturpflanzenforschung, Gatersleben, Germany, 10 to 12-day-old plants of 724 summer and 265 winter barley lines were inoculated on the 1st leaf in the greenhouse with a spore suspension. From 25 samples of the fungus collected in 1955, mostly from around Halle, 3 races were isolated: 1 closely resembling Straib's race 15, and 2 hitherto unknown which have been provisionally named H 10 and H 16. These 3 races were used for field inoculations of the barley collection in 1956–58. Line 1360 (winter), noticeable earlier for its resistance to several races of *Erysiphe graminis* [loc. cit.], was resistant to H 10 and S 15, while summer line 260 (Sulu), also resistant to *E. graminis*, was susceptible to H 10 but resistant to S 15 and H 16. Winter 1077 was also resistant to mildew.

Hirata (K.). **Some observations on the relation between the penetration hypha and haustorium of the Barley powdery mildew (Erysiphe graminis hordei) and the host cell. IV. On the relation between haustorium development and calcium in the host cell.**—*Ann. phytopath. Soc. Japan*, **23**, 3, pp. 139–144, 6 fig., 1958. [Jap. Abs. from Engl. summ.]

In further studies [**37**, 716] at Niigata Univ., the distribution of Ca was determined

in detached primary leaves of barley in water or inorganic salt solutions inoculated with powdery mildew conidia. In infected leaves abundant crystals were found around the haustoria vesicles and on the inner surface of epidermal cells around the penetration pore. The increased susceptibility to fungal penetration of Ca treated leaves [loc. cit.] is probably due to the action of Ca in protecting the surface of the host protoplasm in contact with the haustorium, while reduced susceptibility following treatment with K, Na, NH_3, or Li salts probably results from the removal of Ca from the protoplasm round the haustorium, which affects the functioning of the latter. The high susceptibility of the young leaves, subsequently changing to resistance except at the apex and in the auxiliary cells, is attributed to uneven Ca distribution in the epidermis, while the susceptibility of the auxiliary cells seems to be related to their abundant Ca content.

Dickson (J. G.), Syamanda (R.), & Flangas (A. L.). **The genetic approach to the physiology of parasitism of the Corn rust pathogens.**—*Amer. J. Bot.*, **46**, 8, pp. 614–620, 4 fig., 4 graphs, 1959. [14 ref.]

Inbred lines of maize, with known genes conditioning rust reaction to specific clonal and inbred lines of *Puccinia sorghi*, were used in this study at the Dept Plant Path., Univ. Wisconsin [cf. **38**, 257]. Both high and low temperatures changed necrotic fleck reaction into uredial development, and the reverse, for specific genotype combinations [cf. **38**, 512]. The nature of available carbohydrate (using excised leaves in the absence of photosynthesis) had little effect on either necrotic fleck or uredial development. The comparative rate of and total O uptake by leaves of the same plant, uninoculated and inoculated with lines of the pathogen inciting necrotic fleck, mesothetic-X, and uredial reactions indicated significant differences in physiological response for the 3 reaction types. With necrotic fleck there was initially a high O uptake that subsided with the isolation of the pathogen by host-cell necrosis, in contrast to the continuous increase in O in the compatible reaction. The data indicated that in the necrotic fleck reaction the fungus line was initially virulent but nonpathogenic rather than avirulent as indicated commonly in the literature; also that the compatible and the mesothetic-X reactions were differentially selective, whereas necrotic fleck was incited uniformly on all resistant host genotypes.

Cox (R. S.) & Harrison (D. S.). **Factors affecting the incidence and control of northern Corn leaf blight in sweet Corn production in the Everglades.** *Bull. Fla agric. Exp. Sta.* 596, 20 pp., 4 fig., 1 diag., 3 graphs, 1958. [Received Oct. 1959.]

The severity of northern maize leaf blight (*Helminthosporium turcicum*) during the springs of 1955-6-7 was correlated with temp., R.H., and rainfall; mean weekly min. $< 60°$ F., $< 60\%$ R.H., and rainfall at less than weekly intervals checked the disease. Myer's Jumbo, Myer's Fembro, and TeeJet T 10 nozzle types were all efficient when disease conditions were moderate [**37**, 701]. Dithane M-22 (1½ lb./100 gal.), manzate (1½ lb.), or parzate (2 lb.) + thylate (1½ lb.) at 150–250 gal./acre, according to disease severity, proved the best materials, and were applied equally effectively at 200–400 lb. p.s.i. The crop should be sprayed when the disease is 1st observed, but not before 2 weeks after seeding, 1–2 sprays/week according to weather conditions. The pre-tasselling period is critical for infection and therefore for spraying.

Akai (S.), Tanaka (H.), & Noguchi (K.). **On the mechanism of starch accumulation in tissues surrounding spots in leaves of Rice plants due to the attack of Cochliobolus miyabeanus. I. Observation on starch accumulation in tissues surrounding spots.**—*Ann. phytopath. Soc. Japan*, **23**, 3, pp. 111–116, 1 fig., 2 graphs, 1958. [Jap. Abs. from Engl. summ.]

At Kyoto Univ. within 20 hr. of inoculation with *C. miyabeanus* [**39**, 24] starch

disappeared from the area immediately surrounding the spots and accumulated in a zone beyond. Accumulation increased as the spotted areas developed until the ratio of the area of accumulation to the spotted area became constant, while the conc. of starch continued to increase. Accumulation areas were small in the early morning, grew rapidly with increasing sunshine, remained constant until sunset, and then increased markedly in the evening. In rainy or cloudy weather or if plants were kept 24 hr. in darkness the starch disappeared from around the spots but was still detectable in some samples 10 days after inoculation. Accumulation of starch was also promoted in plants grown in nutrient solution with excessive Mn or low N and in akiochi plants [**38**, 2]. Apparently starch accumulation was partially due to increased activity of starch assimilating enzymes., e.g., phosphorylase, in the area surrounding the spots.

Halisky (P. M.), Smeltzer (D. G.), & Houston (B. R.). **Head smut of Sudan Grass and Sorghum in California.**—*Plant Dis. Reptr*, **43**, 10, pp. 1084–1090, 3 fig., 1959.

The prevalence of *Sphacelotheca reiliana* [**38**, 205] has increased since the introduction in 1955 of Greenleaf Sudan grass, commonly grown as a certified seed crop, and with the widespread planting of susceptible hybrid grain sorghums. Symptoms on Sudan grass generally resemble those on sorghum; spore formation does not always follow infection but there may be sterility or induced phyllody. At Univ. Calif., Davis, soil inoculation with spores from Sudan grass and sorghums infected Sudan grass, sorgo, and grain sorghum vars., but not maize. On examination of the pedigrees of 6 Sudan grass vars. the smut-susceptible Leoti sorgo was found in the parentage of 5 of them, 2 of which were highly susceptible and 3 resistant or immune. Lahoma Sudan grass was not infected in these tests, while Piper and Tift had low infection.

Salibe (A. A.). **Leaf curl—a transmissible virus disease of Citrus.**—*Plant Dis. Reptr*, **43**, 10, pp. 1081–1083, 2 fig., 1959.

A leaf curl and die-back that developed after severe pruning of a Pera orange tree on sweet orange rootstock at the Limeira Citrus Exp. Sta., São Paulo, Brazil, in 1953 was found to be transmissible and caused by a virus. The tree produced abundant flowers, but the fruits were few and small; sprouts on the branches were weak and easily broken, and there was gumming and a suggestion of pitting in the wood. The virus was readily transmitted by budding to Caipira and Hamlin sweet orange seedlings (a distinction from [citrus] dwarf virus of Satsuma orange in Japan [**37**, 585]). Eureka lemon, sour orange, shaddock, and grapefruit. It appears to differ from other known citrus viruses but to be most closely related to the psorosis group.

Loprieno (N.) & Bugiani (A.). **Conservazione della forma picnidica del Deuterophoma tracheiphila Petri in coltura e innovazioni nella tecnica di infezione su piantine di Arancia Amara.** [The preservation of the pycnidial state of *D. tracheiphila* in culture and innovations in the technique of the infection of Sour Orange seedlings.] *Contr. Ist. Ric. agr. Soc. Montecatini, Milano*, **2** (*1957–1958*), pp. 145–153, 7 fig., 1959. [Fr., Engl., Germ. summ. 17 ref.]

A reprint of [**38**, 83].

Rayner (R. W.). **Root rot of Coffee and ring barking of shade trees.**—*Kenya Coffee*, **24**, 285, pp. 361–365, 5 fig., 1 diag., 1959.

Symptoms of root rot and 'collar crack' of coffee caused by *Armillaria mellea* [cf. **30**, 509], found fruiting on old forest logs but never on coffee, are described. Normally the disease causes little damage, but it may sometimes become serious, especially on shade trees felled without barking. The disease occurs in the East

Rift down to 5,500 ft. and is widespread in the West Rift and Nyeri. Rhizomorphs were not observed and infection is by contact with old infected roots. Control measures suggested are the removal of affected trees, possibly with the soaking of the site with a 50% Cu fungicide or CS_2, trenching (1½-2 ft. deep), which may be effective because of the nature of the coffee root system, and ring barking (described in detail) of shade trees before felling. Malayan methods of tree poisoning [cf. **35**, 231] are described, but are not practised in Kenya.

Other root diseases occur, but are not common. A *Ganoderma* sp. [cf. **34**, 453] is often associated with root rot; *Fomes* sp. and *Rhizoctonia bataticola* [*Macrophomina phaseoli*], previously recorded by McDonald [**15**, 633], have not been seen for 18 yr.

Ribeiro (J.). **Estudo preliminar sôbre a incidência do 'secamento de ponteiros' ou 'die-back' em algumas variedades de Cafeeiro (Coffea arabica L.).** [Preliminary study on the incidence of 'shrivelling of the tips' or 'die-back' in some varieties of Coffee (*C. arabica*).] *Ceres, Minas Gerais*, **10**, 59, pp. 413–421, 1958. [Engl. summ. 12 ref.]

In comparative trials at the Escola Superior de Agricultura, Minas Gerais, Brazil, in 1956, 10 vars. were rated as follows in descending order of susceptibility to die-back associated with infection by *Colletotrichum coffeanum* [*Glomerella cingulata*]: Bourbon (mass selection of the Escola), 4·02; Caturra (mass selection) 3·41; Bourbon LC 662, 3·36; Caturra Amarelo, 3·21; Bourbon Amarelo LCJ 30, 3·15; Caturra Amarelo (mass selection), 3·02; Caturra (individual selection), 2·81; Caturra L.C. 477, 2·77; Mundo Novo LCP 379, 2·42; and D 5% (Tukey's), 0·9.

Arnold (M. H.). **A note on seed treatment with mercurial compounds in the Lake Province of Tanganyika.** *Emp. Cott. Gr. Rev.*, **36**, 3, pp. 161–164, 1959.

Experience in E. Africa shows that control of cotton bacterial blight (*Xanthomonas malvacearum*) [cf. **39**, 172, *et passim*] by seed treatment with cuprous oxide formulations does not prevent the secondary build-up of the disease. Coloured 1% Hg dressings applied at 1:150 w.w. the rate advocated as a safety measure to ensure that treated seed can readily be seen by farmers, proved superior to cuprous oxide at 1:200. For non-delinted seed the opt. charge for the 35 cu. ft. Booth drum used was 8 cwt., and with adequate ventilation of the building a 1% formulation caused no unpleasant effect to the operators, who were suitably masked and gloved, and who washed under supervision after a shift.

Last (F. T.). **Effect of Cotton leaf resistance factors on the spread of Xanthomonas malvacearum (E. F. Sm.) Dowson in the Gezira, Sudan.** *Emp. Cott. Gr. Rev.*, **36**, 3, pp. 187–195, 9 graphs, 1959.

A study at the Gezira Res. Sta., Sudan, of the abilities of the new cotton vars. with B genes [**39**, 172] to limit the natural spread of *X. malvacearum* showed that they retarded spread in field crops in 1956–7–8 about as much as they retarded the development of individual lesions. B_2 was least effective. B_2 B_3 [**38**, 694] intermediate, and combinations with B_{6m} [**38**, 146] were the most effective. B_2 B_{6m} and B_2 B_3 B_{6m} vars. did not differ appreciably.

The duration of the intervals between rain and irrigation undoubtedly affected incidence, recently irrigated plants of the B_2 B_3 derivative BAR 14/25 of Domains Sakel being more diseased after a rainstorm than plants not irrigated for 6 days or more.

Last (F. T.) & Dransfield (M.). **Measurement of the resistance of Cotton to Xanthomonas malvacearum (E. F. Sm.) Dowson using a leaf abrasion technique.**—*Emp. Cott. Gr. Rev.*, **36**, 3, pp. 196–199, 1 graph, 1959.

In the Sudan resistance to *X. malvacearum* is usually assessed by the leaf spray

technique of Knight and Clouston [cf. **18**, 796], leaf infections being graded 3 weeks later. Recently, however, a leaf-rubbing technique giving local lesions has shown promising results. The 4 youngest fully expanded leaves of 8 plants of each var. were inoculated (each ½ leaf separately, with 1 of 8 dilutions of the inoculum) 56 days after sowing. The most conc. inoculum was turbid and yellow, the others were serial 1/10 dilutions. The wetted upper surfaces was abraded with carborundum [cf. **37**, 639] before rubbing with a drop of inoculum on the finger tip, and the plants remained in the plant house without any special maintenance of high humidities. Angular leaf spots developed within 7 days. An advantage of the technique is its independence of weather, much can be achieved with a few plants and little inoculum, and the results are given by direct counting, though grading can be applied.

Steyaert (R. L.). **Quelques données sur la physiologie de la capsule du Cotonnier (en vue de l'étude de la stigmatomycose).** [Some data on the physiology of the Cotton boll (with a view to the study of stigmatomycosis).]—*Ann. Gembloux* (*1959*), pp. 305–332, 6 graphs, 1959.

A full account, originally prepared in 1938 [cf. **18**, 797], is given of studies on the sugar content of cotton bolls in relation to breeding against internal boll rot (*Nematospora coryli* and *Ashbya* [*N.*] *gossypii*) [cf. **27**, 474]. The aspects dealt with include variations in sugar content as a function of the age of the boll and of the date of sowing, genetic effects on the sugar content, and variations in boll size with age.

Hoffmann (G. M.) & Rondomanski (W.). **Eine Verticilliose des Leins (Linum usitatissimum) in Deutschland.** [A verticilliosis of Flax in Germany.]—*Nachr-Bl. dtsch. PflSchDienst, Berl.*, N.F., **13**, 5, pp. 91–92, 3 fig., 1959. [Russ., Engl. summ.]

From the Institut für Phytopathologie, Aschersleben, is reported a flax disease caused by *Verticillium alboatrum*, observed for a number of years in Brandenberg and Saxony-Anhalt, but not previously described. Affected plants occur in groups and are detectable at the time of ripening by a leaden grey to dark grey discoloration of the stem, in the lower parts only or throughout, including the branches at the level of the inflorescence. The diseased plants are often broken and collapsed; they are readily pulled from the ground and the root system is extensively damaged. In the diseased parts of the stem cortical tissue is readily separated from the woody parts, and the fibres are weakened and commercially useless. Numerous microsclerotia are scattered throughout the cortical parenchyma, the woody parts, and the pith cavity. The cortical tissues are shrivelled and filled with air, which causes the grey appearance.

V. alboatrum was isolated from affected plants and its pathogenicity proved by inoculation and re-isolation.

Rangone Gallucci (Maria M.). **Una verticilliosi in ibridi de Gerbera jamesonii Bolus.** [A verticilliosis of hybrids of *G. jamesonii*.]—*Boll. Lab. sper. Fitopat., Torino*, N.S., **21** (*1958*), 1, pp. 57–61, 1 pl. (7 fig.), [? 1959. Engl. summ.]

A wilt of *G. jamesonii* in a nursery near Turin in Sept. 1958, which affected 20–25% of the Stuifhoek var. and about 10% of Vinkin, proved attributable to *Verticillium alboatrum* [cf. **34**, 351]. Symptoms appeared in late spring 1957; by July the disease was spreading rapidly, infection lessened during the hottest part of the summer, and then increased in mid Sept., to cease almost completely in Nov. The disease (a new record for Italy) appears to be present also in other parts of Piedmont and in Liguria.

Graves (W. E.). **Sterilizing Orchid seed for planting.**—*Bull. Amer. Orchid Soc.*, **28**, 5, p. 334, 1959.

In a sterilizing solution the seeds gather air bubbles liable to carry over mould spores, unless they are shaken vigorously for 15 min. Air bubbles may be prevented and the sterilizing time reduced by previous soaking for several hr. This may be done in $\frac{1}{2} \times 2$ in. plastic bottles filled $\frac{1}{2}$ in. deep with distilled water; after soaking, $\frac{1}{2}$ oz. of distilled water with 1 dissolved Cl tablet is added. After shaking for 3–4 min., the contents are poured into sterilized flasks where the seed is to be germinated. When, through the rotation of the flasks, the seeds are uniformly distributed on the agar, the solution is poured off. The advantages are that the seed retains less Cl, becomes heavy enough to distribute more evenly over the agar, and starts to germinate faster. Seed sterilized in this way for only 1 min. developed no mould after 3 weeks.

Kristensen (H. R.) & Thomsen (H.). **Virussygdomme hos Roser I.** [Virus diseases of Roses I.]—*Tidsskr. Planteavl*, **63**, 3, pp. 369–393, 10 fig., 1959. [Engl. summ. 25 ref.]

The symptoms of 7 viroses occurring in different countries are described, of which only rose yellow mosaic, originally reported from Calif. [**19**, 409], has so far been investigated in Denmark. A single affected plant of var. Louis Brenas was observed in 1953, since when the disease has been noticed in 23 other vars. The symptoms are extraordinarily variable in different vars. and under diverse conditions of cultivation; they include marked vein-clearing of the leaves in Circus, Eclipse, and Masquerade; ill-defined, flame-yellow mottling in Flaming Sunset, Heidekind, and Louis Brenas; a combination of these in Cryssler Imperial and Maidens Blush; and varying numbers of small, citron-yellow, sharply delimited spots on Columbia, Gloraming, McGredy's Sunset, and Monique. The virus has been transmitted by budding to 11 vars. and 4 stocks (Peace, Mme. Meilland, *Rosa multiflora*, and *R. canina*), all of which reacted by more or less distinct but very variable symptoms, even among plants of the same var. Stunting in some of the inoculated stocks of *R. multiflora* may be induced by a latent virus in addition to the one investigated. Owing to the intensity of the reactions in this sp. it serves as a useful indicator. In *R. canina*, on the other hand, the symptoms were very faint, and during a large part of the growth period almost completely masked. In preliminary experiments their development was inhibited by high temps. The virus was not transmissible to cowpea or cucumber.

So far, rose yellow mosaic appears to be a relatively rare disease in Denmark, where the stringent sanitation enforced in nurseries should reduce its incidence to a min. especially in conjunction with a scheme for testing stocks.

Goodman (P. J.), Braybrooks (Mrs. E. M.), & Lambert (J. M.). **Investigations into 'die-back' in Spartina townsendii agg. I. The present status of S. townsendii in Britain.** *J. Ecol.*, **47**, 3, pp. 651–677, 2 pl., 2 graphs, 2 maps, 1959.

Goodman (P. J.). **The possible role of pathogenic fungi in 'die-back' of Spartina townsendii agg.** *Trans. Brit. mycol. Soc.*, **42**, 4, pp. 409–415, 1959.

During this study by the Bot. Dept, Univ. Southampton, a retrogression of mature *S. townsendii* swards was found in a limited number of localities, particularly in the Hants Basin, and predominantly at 2 different types of site, either along the edges of the main channels, or in low-lying pans in the centre of marsh segments. Evidence is assembled that the cause of the 'die-back' is essentially a physiological-ecological problem, being associated with particularly soft, wet, finely particled substrata and impeded drainage. Examination of moribund material revealed no obviously pathogenic fungi among the 22 taxa isolated or identified. Seedlings

planted in sand culture alongside heavily fungus-infected plants grew strongly, while unhealthy plants set beside healthy ones in the field did not pass on any infection but recovered, whereas healthy plants transplanted to 'die-back' sites died.

Fry (P. R.). **A Clover mosaic virus in New Zealand pastures.**—*N.Z.J. agric. Res.*, **2**, 5, pp. 971–981, 8 fig., 1959.

This disease, which apparently has been established for many years, affects more than 50% of the plants in many pastures over 4-yrs.-old and was found on white, red, subterranean, and strawberry clovers, broad bean, and sweet pea. In glasshouse tests at the D.S.I.R., Auckland, a loss of 24% yield of white clover, 50% of red, and 36% of subterranean was demonstrated. The virus was transmitted mechanically to pea, bean [*Phaseolus vulgaris*], blue lupin, mung bean [*P. aureus*], and cowpea, but not to *Lotus uliginosus*, lucerne, cucumber, spinach, tobacco, or *Nicotiana glutinosa*. Natural transmission is probably by some as yet undetermined insect vector; seed transmission appears not to occur. The host range, symptoms, thermal inactivation at 60° -62° C., and tolerance of dilution 10^{-6} but not 10^{-7} indicate close relationship with Johnson's pea wilt virus [**21**, 293].

Martin (J. P.). **Studies on northern anthracnose of Red Clover and its incitant, Kabatiella caulivora.**—*Diss. Abstr.*, **20**, 3, pp. 862–863, 1959.

At Univ. Wisconsin, *K. caulivora* [cf. **37**, 731; **38**, 368] was isolated without difficulty from stems leaves, and petioles of red clover, the most important factor in successful isolation being to incubate plant materials at 16° C., which inhibits other fungi likely to overgrow the pathogen at higher temps. The tendency of some isolates to lose pathogenicity and cease sporulating on some media was overcome by culturing on autoclaved red clover petioles or on potato-cerelose slants and then covering with sterile mineral oil. Such cultures remained stable throughout the 6 months of the study. One-week-old inoculum from agitated potato-cerelose broth at 21–24° gave the highest percentage infection: older inoculum caused severity ratings to fall sharply and percentage infection slightly. When the above-ground parts were atomized with a spore suspension (4,295,000 spores ml.) av. infection was 93%, the figure for 7,250 spores ml. being 3%. The opt. temp. for disease development was 20 -24°; only traces of infection occurred at 28°. Infection was heaviest in plants kept in a humidity chamber for 3–4 days on inoculation.

The fungus was able to survive Wisconsin winters in lesions on stems, petioles, and leaves, as well as in the soil. Air currents can transmit the fungus when plants are wet, but are probably of minor importance when plants are dry. The spores germinated in 12–24 hr. and penetrated the host in 48–72 hr. Penetration was direct and not via the stomata. In the early stages of infection in leaf and petiole tissues the hyphae remained on the cortex adjacent to the epidermis, but later were not restricted to any specific tissue and were both inter- and intracellular.

Chi (C.-C.). **The relation of Fusarium species to wilts and root rots of Red Clover.**—*Diss. Abstr.* **20**, 3, pp. 860–861, 1959.

Further information is given from Univ. Wisconsin [**39**, 177]. The opt. temp. for growth and conidial germination of all isolates of *F. oxysporum*, *F. roseum*, and *F. solani* was 28° C. Only *F. solani* grew at 36°, and only *F. roseum* at 4°. Potato sucrose medium, and then wheat bran, were the best all-purpose substrates tested. Dextrose, then maltose and sucrose were the best of 8 C sources. Organic N was best, and nitrate N superior to ammonium N.

The Lakeland and Dollard red clover vars. were susceptible, Chesapeake and

Pennscott intermediate, and Kenland resistant. When 19 spp. of 4 plant families were tested for susceptibility to red clover isolates, only legumes were infected.

The fungi produced a thermostable toxin, which, when taken up through cut ends of red clover stems, caused vascular browning, plugging, and wilting; wilting was more rapid in the light than in the dark. In 1:4 dilutions of the filtrate wilting was rapid and severe, while dilutions $> 1:8$ produced less obvious symptoms. The fungi entered the host through wounds and also by direct penetration of the epidermal cells of the root tip and through root hairs, and then passed through the parenchyma into the xylem, in which growth was mainly in the tracheids, though later other cells were invaded.

McVey (D. V.). **The morphology and pathogenicity of Leptodiscus terrestris.**—*Diss. Abstr.*, **20**, 1, pp. 19–20, 1959.

At Univ. Illinois, spores of *L. terrestris* [**34**, 229] produced small sunken necrotic spots on leaflets of lucerne, red clover [**37**, 547], sweet clover (*Melilotus alba*), and birdsfoot trefoil (*Lotus corniculatus*). On lucerne and sweet clover the spots had a greenish-yellow halo, but on the others the halo was indistinct or absent. Small, black, elongated lesions on the petioles of lucerne, sweet clover, and *L. corniculatus* caused leaf abscission, while the petioles of red clover collapsed at the point of infection.

In all 4 hosts the stem lesions were blackened areas, and in lucerne and *L. corniculatus* the parts above the lesions died.

The external symptoms of crown and root rot were dark brown lesions with black bands within the dark brown area of the advancing margin. Internally there was a V-shaped black advancing margin of decay, and sclerotia were usually present in the brown decayed tissue. The fungus entered the crown of lucerne from dead stems and wounds, and the taproot through wounds. The mycelium was intracellular, making its greatest progress longitudinally in the xylem vessels and tracheids, in advance of cell disorganization. Periderm formation in the secondary phloem of unwounded roots prevented the fungus from reaching the cambium. Plugging of the vessels occurred in both infected roots and wounded controls. In red clover a periderm did not always form, and when present it did not prevent the advance of the fungus. In *L. corniculatus* it grew through the secondary phloem and into the xylem of both wounded and unwounded roots: a phellogen, where formed, did not prevent the advance of the mycelium.

Kainski (J. M.). **A study of fungi involved in root rots and seedling diseases of Birdsfoot Trefoil.**—*Diss. Abstr.*, **20**, 2, pp. 467–468, 1959.

A survey over 3 consecutive growing seasons of 81 fields in 13 counties of N.Y. State was made from Cornell Univ. to determine the pathogens associated with root rots [cf. **37**, 496] of birdsfoot trefoil [*Lotus corniculatus*]. Rotting of fibrous roots was most frequently associated with pathogenic isolates of *Fusarium oxysporum*, *F. solani*, *F. moniliforme* [*Gibberella fujikuroi*], *F. roseum* [**39**, 27], and *F. tricinctum*. *F. oxysporum*, *G. fujikuroi*, and *F. roseum* were isolated most often from the pith. Cortical rot yielded *Sclerotium bataticola* [*Macrophomina phaseoli*], *Rhizoctonia* [*Corticium*] *solani*, *Phialophora* spp., and pathogenic species of *Fusarium*. Root rot and damping-off of young seedlings in the greenhouse were associated with *F. oxysporum* and *Pythium* spp.

In all, 551 isolates were tested on seedlings in sand culture. Many isolates of *F. oxysporum*, *F. solani*, *F. roseum*, *G. fujikuroi*, and *F. tricinctum* and 1 isolate each of *C. solani*, *M. phaseoli*, *Sclerotinia sclerotiorum*, and *Phialophora* spp. were highly virulent. Several isolates of *Penicillium*, *Trichoderma*, *Fusarium*, 1 of *Spicaria violacea*, and many not identified, while not highly virulent, caused some destruction and malformation of the roots and basal part of the seedlings. It is believed

that these fungi may predispose seedlings to attack by weak pathogens. Fungi non-pathogenic to seedlings in sand culture were not pathogenic to older plants in steamed and non-steamed soil.

F. oxysporum, *F. roseum*, *G. fujikuroi*, and *F. tricinctum* caused rotting of fibrous roots in steamed and unsteamed soil. *F. oxysporum* and *F. roseum* infected leaves and stems under controlled conditions. Very virulent strains of *C. solani* and *M. phaseoli* produced cortical rotting of the roots. *C. solani* was pathogenic to the roots of young and mature plants in steamed and non-steamed soil. It is concluded that many different species of fungi contribute to root rots of *L. corniculatus*.

Current research and investigation.—*Orchard. N. Z.*, **32**, 9, p. 267, 1959.

Less Jonathan spot [cf. **38**, 369] occurred on apples stored in polythene bags in wooden cases than on fruit stored normally, but scald incidence [cf. **38**, 525, 529, 606] offset this advantage.

Pale green ring spots were found on pear leaves in central Otago. When buds from the infected trees were worked to pear seedlings, leaf chlorosis developed, suggesting a virus [cf. **38**, 380]. A severe strain of apple rubbery wood virus [**38**, 526] introduced into Lord Lambourne made 1-yr.-old trees so flexible that they lay flat on the ground. The only widely grown variety infected is Golden Delicious. Infected trees may have a few slightly rubbery shoots, but the usual symptoms are poor growth of leaders and stunting of the tree. No fruit symptoms are known.

Controlled atmosphere storage [cf. **38**, 528] was tested on Ballarat and Sturmer apples held at 38° F. in 5 different atmospheres. Ballarats developed severe scald except in air, though they became harder towards the end of the experiment than the fruit in air storage. No scald was noticed on Sturmers of which those in gas mixtures were preserved hard, green, and in excellent condition, while those in air turned mealy. After 14 days at 65° air-stored fruit was mostly affected by scald, fungus rots, and wilt, so that 2 weeks after removal there was only 7% sound fruit left; while over 90% of the gas-stored was in good order.

Hunter (J. A.), Chamberlain (E. E.), & Atkinson (J. D.). **Note on a modification in technique for inactivating Apple mosaic virus in Apple wood by heat treatment.**—*N.Z.J. agric. Res.*, **2**, 5, pp. 945–946, 1959.

Since the heat treatment of wholly infected, virus diseased plants is difficult and that of scion-wood not always successful, the application of heat therapy to budded seedlings was investigated. A number of healthy Jonathan seedlings were budded in mid Dec. from trees carrying a mild, moderate, or severe strain of apple mosaic virus and after the establishment of the union put into a heat cabinet at 37°±1° C. for 28–40 days [cf. **39**, 115]. The heat-treated seedlings subsequently planted in the open showed no symptoms of the disease during the following summer, when check trees were all affected.

Geshele (É. É.). К биологии возбудителя парши Яблони в условиях Сибири. [On the biology of the causal agent of Apple scab in Siberian conditions.]—*Trans. Omsk Inst. Agric.*, **22**, 2, pp. 117–122, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 19, p. 198, 1959.]

From observations in 1946–56 of apple trees in the gardens of the Inst. and at the Hort. Lab. of the Siberian sci. Res. agric. Inst., the Omsk ecotype of the parasite [*Venturia inaequalis*: **39**, 28] needs high humidity for its development. Siberian Reinette is the var. principally attacked but infection on trees bearing large type fruit, severe in the European parts of the U.S.S.R., is only mild.

Elandt (Regina). **O zastosowaniu kontrastów ortogonalnych i regresji krzywoliniowej przy opracowaniu doświadczeń fitopatologicznych.** [The use of

orthogonal comparisons and curved regressions in dealing with phytopathological experiments.]—*Roczn. Nauk rol.* **75**, 2, pp. 189–231, 1957. [Russ., Engl. summ. Abs. in *Referat. Zh. Biol., 1959*, 19, p. 195, 1959.]

The use of this method is demonstrated in dealing with spraying trials against apple scab [*Venturia inaequalis*] with Bordeaux mixture.

Goossen (H.) **Studies on the efficiency of spraying and atomising in fruit farming in relation to distribution of wash, deposition of active ingredient, and rain-resistance of deposits applied by spraying and atomising.**—*Höfchenbr. Bayer PflSchr. Nachr.*, Engl. Ed., **11**, 4, pp. 132–154, 16 fig. (2 col.), 9 graphs, 1958. [20 ref. Received Dec. 1959.]

The methods and machines used in a commercial Cox's Orange apple orchard in Westphalia are fully described and discussed [cf. **33**, 543; **37**, 331]. The machines were a self-propelled sprayer with lance, spray gun, or curved boom, and a tractor-drawn (trailer type) atomizer. To throw light on causal relations between a possibly varying biological efficiency and the method of application, studies on the distribution of wash in the crop were made by attaching paper foils to the leaves (H. Goossen, *Z. PflKrankh.*, **59**, pp. 339–353, 1952) and quantitative determinations of active ingredient carried out. Treatments with fungicides (against scab [*Venturia inaequalis*]), insecticides, and acaricides covered the entire growing period (2 Apr.–1 Aug. 1957).

The spray pattern exposure was replicated 6 times for the inner and outer sides of the trees (the inner being that facing the spraying machine, the outer that remote from it). The quantitative determinations of active ingredients were made by the method of Neuhaus [**32**, 326] and of Goossen & Eue [**34**, 163] on the lower and upper surfaces of leaves at 50, 100, 150, 200, and 250 cm. above the ground, the results being recorded separately for the inner and outer sides of the tree. The treatments (copper oxychloride, DDT lindane, wettable sulphur, captan, parathion, metasystox, and lead arsenate) were applied on 9 occasions.

The results showed that when the same quantities of active ingredient were used spraying gave a greater disposition of active ingredient than atomizing, which at 185 l. ha. (1:7) gave appreciably less (active) deposit than 325 l./ha. (1:4). A curved boom gave a more favourable coverage than a spray gun. Deposits from atomizing were more rain-resistant [cf. **39**, 121] than from spray; as a result, the total quantities of active ingredient after each replicated treatment, determined on the tree, were approximately the same for both.

Foliage above a height of 200 cm. received relatively little active ingredient, whatever the method.

When atomizing is carried out over relatively long distances, the carrier air-current should be so distributed as to eliminate appreciable loss of active ingredient. To reduce the droplet size to under 150 μ is a dangerous practice in atomizing. Fully mechanical spraying at 1,300 l./ha. and atomizing at 325 l./ha. are both recommended. Reduction of the rate of application in atomizing to $\frac{1}{7}$ of the normal rate (i.e. to 185 l./ha.) is not advised in view of the biological effect.

Cole (M.). **Bacterial rotting of Apple fruit.**—*Ann. appl. Biol.*, **47**, 3, pp. 601–611, 1 pl. (6 fig.), 1 graph, 1959.

At Dept Bot., Imperial Coll., London, 3 bacterial isolates from a rotten apple produced actively spreading, firm, brown rots when stab-inoculated into Bramley's Seedling apples, but bacteria were not found at the front of the rot. One isolate, a capsulated, non-motile, non-fluorescent, Gram— rod appeared to be previously

undescribed, and for this the name *Pseudomonas pomi* is proposed. The other 2 isolates were identical with *P. melophthora* [**11**, 657], a new record for the United Kingdom.

The 3 isolates grew on media at pH 5 and in apples with juice of pH 3·5. For each, the square of the distance of the front of the rot from the point of inoculation was directly proportional to the time since inoculation. The isolates were able to invade apples at the stalk and eye ends and through pricks in the skin, but did not infect shoots or flowers. Stored Lane's Prince Albert and Laxton's Superb apples were susceptible.

Scurti (J. C.). **Attacchi di basidiomiceti e manifestazioni di 'mal del piombo' nelle Prunoidee. Nota II. Generalità sulla malattia, sulla sua diffusione nel Saluzzese e caratteri dei basidiomiceti isolati dalle piante colpite.** [Attacks of basidiomycetes and manifestations of 'silver leaf disease' in the Prunoideae. Note II. Generalities upon the disease, its spread in the vicinity of Saluzzo, and the characters of the basidiomycetes isolated from affected plants.]

Borzini (G.) & Scurti (J. C.). **Nota III. Trasmissione sperimentale della malattia e prove orientative sui sistemi di lotta.** [Note III. Experimental transmission of the disease and preliminary experiments on methods of control.—*Boll. Lab. sper. Fitopat., Torino*, N.S., **21** (*1958*), 1, pp. 19–39. 2 col. pl., 6 fig.; pp. 41–56, [? 1959. Engl. summ. 65 and 18 ref.]

In further work on a fatal decline of peach vars. growing near Cuneo, Italy [**36**, 800], agar cultures failed to distinguish the organisms concerned, but cultures on decorticated peach wood on moist peach sawdust inoculated with mycelium from agar and grown in the light (but not full sunlight) enabled 2 basidiomycetes (fully described) to be distinguished. One was considered to be *Fomes fulvus* Bres. (= *F. igniarius* ssp. *pomaceus*) [cf. **35**, 335] and the other *Gloeocystidium contiguum* f. *laxa*; sporophores of both were obtained in culture. The systematic position of both is discussed.

The disease proved transmissible by grafting healthy scions on diseased stocks. In addition, inoculation with 5 basidiomycetes isolated from silvered plants indicated that *G. c.* f. *laxa* was responsible for silvering of the leaves, and *F. fulvus* for a slow necrosis of the wood, symptoms being more readily induced on poorly drained and nutrient deficient soils. Avoidance of such conditions and also soil injection during the initial stages of the disease of 10 l. of 0·01% oxyquinoline sulphate solution/tree are recommended.

Atkinson (J. D.), Chamberlain (E. E.), & Hunter (J. A.). **Cherry variegation in New Zealand.**—*N.Z.J. agric. Res.*, **2**, 5, pp. 938–944, 3 fig., 1959.

This non-infectious disorder, arising probably from bud sports, is widespread. It is supposedly identical with the disease known as variegation, or virus-like variegation, in Europe [**37**, 242] and as cherry white crinkle in N. America [cf. **36**, 8].

Vasil'kova (Mme A. K.). Бактеріальний рак кісточкових на півдні України. [Bacterial canker of stone fruit trees in southern Ukraine.]—Бюлл. н.-т. Інформ. Садівництву [*Byull. n.-t. Inform. Sadivnytstvu*], *1957*, 4, pp. 72–76, 1957. [Abs. in *Referat. Zh. Biol.*, *1959*, 19, p. 199, 1959.]

At the Melitopol Exp. Sta. inoculations were made on Mazzard cherry, cherry, apricot, and peach (5–10-yr.-old) with *Pseudomonas syringae* [**37**, 589] isolated from infected trees. Methods, symptoms, duration of the disease, phenological observations, and control measures are described.

Peterson (C. E.) & Hooker (W. J.). **Tawa : a new early Potato variety resistant to late blight, scab, and immune to latent mosaic.**—*Amer. Potato J.*, **36**, 8, pp. 267–274, 1 fig., 1959.

Tawa, developed by the Iowa and Mich. agric. Exp. Stas. and released by the U.S. Dept Agric. in June 1956, is the 1st var. to combine resistance to *Phytophthora infestans* race 0 [**39**, 188] and *Streptomyces scabies* with a high degree of resistance to potato virus X. Scab resistance, while not so high as that of Ontario, Cayuga, or Menominee, is considerably higher than that of Sebago. Resistance to virus X is of the 'immune' type, similar to that in Seedling 41956 [**37**, 551]. Field resistance to blight remains to be evaluated. Repeated attempts to establish potato virus A infection by graft inoculation have failed. Tawa cannot be classified as highly resistant to *Verticillium* wilt [*V. alboatrum*], but it is less susceptible than the widely grown Early Gem, Triumph, and Red Warba.

Hooker (W. J.), Kim (W. S.), & Thompson (N. R.). **Distribution of Potato virus X in tolerant Potatoes.**—Abs. in *Amer. Potato J.*, **36**, 8, p. 295, 1959.

In determinations at Michigan State Univ. [**39**, 186] of the conc. of potato virus X in potato plants of tolerant vars. the results obtained by microserological precipitin tests and by local lesion assay on *Gomphrena globosa* were generally in good agreement except for analyses of the tubers and upper stems. The conc. of the virus was highest in the upper and middle leaves, somewhat lower in the lower leaves, relatively low in the stems, and lowest in the lower stem. In the tubers conc., assayed by the local lesion method, approximated to that in the leaves. In 42 naturally infected certified seed lots, including 13 vars., conc., determined twice in the season, was essentially similar between vars. and between different seed lots of the same var.

Kim (W. S.) & Hooker (W. J.). **Purification and physical chemical studies of Potato virus X. Studies on degradation products of purified Potato virus X.** Abs. in *Amer. Potato J.*, **36**, 8, p. 297, 1959.

The purification method utilized the different electrochemical properties of the virus [cf. above] and host proteins. Purified virus, homogeneous as a single peak pattern, was obtained electrophoretically when the virus was suspended in 0·1 M borate buffer in the pH range 3–10. Electrophoretic mobility at pH 7 was $1{\cdot}22 \times 10^{-5}$ cm. sec. volt cm., and the isoelectric point pH 4·4. The virus was apparently highly hydrated, and its mol. wt. was calculated to be approx. $38{\cdot}5 \times 10^6$ g./mole. Purified virus has been obtained from leaves of tobacco, tomato, *Nicotiana glutinosa*, and *Datura tatula*. The modal length of the particles, determined by electron microscopy, was 400–500 μ. Purified virus was 100 times more infective than the virus-infected leaves from which the virus was isolated.

Ultra-microscope studies indicated that pepsin rapidly digested the outer protein portion of the particles, while trypsin induced aggregation. Pepsin slowly reduced infectivity at pH 7, and trypsin immediately; both decreased antigenicity. Ribonuclease inhibited infectivity. Dialysis of the virus against glycine-HCl buffer at pH 2 or carbonate-bicarbonate buffer at pH 10·7 for 48 hr. separated a nucleic acid and a protein component, which were isolated and characterized. The infectivity of 20 ml. of a 0·9% virus suspension was reduced almost to nil by 2 drops of 40% formalin, but greatly restored by treating the same virus solution in the carbonate-bicarbonate buffer for 48 hr. Repeated suctional filtration through 2 layers of Whatman No. 1 filter paper fragmented the particles, reducing infectivity to 70% and antigenicity to 50%. Ultrasonic waves (10 kc.; 15 min.) destroyed infectivity and markedly reduced antigenicity. The virus aggregated and denatured rapidly in water, but slowly in borate buffer at pH 7.

Kozłowska (Aniela). **Detection of latent strains of Potato virus X by ultraviolet light.**—Abs. in *Amer. Potato J.*, **36**, 8, pp. 298–299, 1959.

When tobacco seedlings were inoculated with sap from tubers of Majestic and Dunbar Rover infected with the mild X^H strain of potato virus X [**38**, 249] they developed no visible symptoms, but under ultra-violet light there was fluorescence of the veins on the lower side of the leaves. Leaves which fluoresced were positive to a precipitation test with antivirus X serum. Under ultra-violet light local lesions on tobacco leaves inoculated with virulent virus strains could be counted precisely.

Kozłowska (Aniela). **Relation between absorption of potassium and phosphorus by Potatoes and the development of virus diseases in their tissues.** Abs. in *Amer. Potato J.*, **36**, 8, p. 298, 1959.

Potato plants growing in Poland and Hungary infected by virus Y [**37**, 368] contained a higher percentage of K and P than healthy controls growing under the same conditions. When shoots from these plants were placed in acid and alkaline 0·05 M solutions of KH_2PO_4, the infected shoots took up more of these elements than the healthy, particularly from weakly alkaline solutions. Mention is made of a number of experiments in which virus-infected and virus-free potato stocks were transferred to other regions [loc. cit.] offering different growth conditions. Infected potatoes from the mountains grown in the lowlands developed milder symptoms in their 1st yr., with a yield increase and a lowering of K and P in the tubers. There is a relationship between intensity of respiration, the levels of organic acids and amino acids, K and P, and the development of virus protein in the tissues.

Klinkowski (M.). **A necrotic type of Potato virus Y.**—Abs. in *Amer. Potato J.*, **36**, 8, pp. 297–298, 1959.

The vein-browning variant of potato virus Y [M3:**37**, 420] causes varying and often masked symptoms in potato, frequently difficult to differentiate from those of other virus infections. In July and Aug. all vars. tested showed sporadic 'late streaks', i.e. streak necroses of varying shape near the veins on the lower side of the leaf. The stems of infected plants lean outwards. The proportion of necrosis in relation to the older known strains of virus Y was, in 1954, 1:100, 1955, 1:6·2, 1956, 1:0·8, and in 1957, 1:1. M3 is serologically demonstrable with the same degree of exactness as with strs. of potato virus X, expanded leaves near the tip of the plants providing the most satisfactory test material. Field plants can be tested 5 weeks after planting, when they are 3–4 in. high, and in the spring plants raised in the greenhouse can be indexed in their 4th week. The level of infection in highly susceptible tobacco growing close to potatoes permits that likely to develop in the latter to be forecast.

Latent infections depress potato yields by an av. of 13·8%, and manifest infections by 20·6%, as compared with 50% for the older known strs. The influence of the new str. on maturity is not significant. When tubers from infected plants are harvested early the resultant progeny show weaker symptoms, perhaps because the virus conc. is lower. Since this effect is more marked with the older strs. it is supposed that the new str. is translocated more rapidly.

Van Slogteren (D. H. M.). **Some recent developments in indexing virus infected Potato plants in the Netherlands.**—Abs. in *Amer. Potato J.*, **36**, 8, pp. 303–304, 1959.

The author refers to the development of serological tests for the detection of potato viruses X, S, and M [**39**, 34]. These tests can be combined to a considerable extent by mixing the respective antisera. The procedure now generally used is a serological micro-agglutination test under paraffin oil, which greatly reduces the amount of antiserum needed, and halves the outlay of time and labour.

Now that the vein-browning strain of virus Y [see above] is spreading westwards from Central Europe, serological testing is needed for virus Y also, and the rapid test under paraffin oil is especially suitable in view of the fact that normal agglutination methods for this virus take up to 3 hr. A gel diffusion method in agar has given clear results with virus X, but not, so far, with the other viruses [cf. **39,** 244]. The antiserum is pipetted into a hole in a thin agar layer inside a glass ring glued to the bottom of a petri dish and the sap of plants to be tested into peripheral holes.

Silberschmidt (K. M.). **History and recent observations on types of Potato virus Y necrotic to Tobacco.**—Abs. in *Amer. Potato J.*, **36**, 8, p. 303, 1959.

A str. of potato virus Y, necrotic to White Burley tobacco, was recently isolated on several occasions from the potato vars. Augusta, Heida, and Fina, at the Instituto Biologico, São Paulo, Brazil. While symptoms were most marked in White Burley, the strain was also transmitted by sap abrasion to *Nicotiana glutinosa*, *N. rustica*, *Petunia hybrida*, *Physalis floridana*, tomato, and *Saracha jaltomata*. Bona potato plants were infected by viruliferous *Myzus persicae*. Although other virus strs., necrotic to tobacco, have also been encountered at the Institute in potato samples from the Andes, the author believes that the necrotic strain currently met with in Central Europe [see above] cannot be traced to a South American source. Seed potatoes imported from Central Europe into Brazil should therefore be inspected for this infection. Certain strains of virus Y fail to infect potato vars. susceptible to the standard strains of the virus [cf. **37**, 114].

Bagnall (R. H.) & Young (D. A.). **Inheritance of immunity to virus S in the Potato.**—Abs. in *Amer. Potato J.*, **36**, 8, p. 292, 1959.

Saco, a var. immune from potato virus X, is also highly resistant to or immune from potato virus S [cf. **39**, 34]. When the progeny of crosses with Saco and selfed Saco were tested against virus S, it was found that where Saco had been crossed with an unrelated seedling, susceptible to both X and S virus, there was no immunity from virus S, but if the seedling parent was, like itself, an X-immune offspring of seedling 41956, a small percentage of seedlings immune from virus S resulted. In the progeny of selfed Saco the percentage was substantially higher. There was no apparent correlation between immunity from the 2 viruses in the seedlings tested.

Larson (R. H.) & Oshima (N.). **Potato virus S recovered from the roots of the 'immune' variety Saco.** Abs. in *Amer. Potato J.*, **36**, 8, p. 299, 1959.

On reaching 7 in., single stem plants of the var. Saco [cf. above], grown at 18 -20° C. from tubers known to be free from potato viruses F [potato aucuba mosaic str.], X, Y, leaf rolling mosaic, and leaf roll were top grafted with scions of seedling 41956 infected with virus S. After 6 weeks the entire plants were thoroughly washed and the different parts tested on *Nicotiana debneyi* which develops very pronounced systemic vein-clearing and incipient mottle symptoms in 21–28 days at 20°. The test potato plants were grown in steam-sterilized soil as a precaution against tobacco necrosis virus. The virus was recovered from leaves and roots of infected 41956 controls but not from Saco. In the grafted plants it was always recoverable from the scions but never from the leaves of the Saco stocks, though it was from the Saco roots, indicating apparent passage of virus S through the stem tissues to multiply in the roots of the otherwise immune Saco.

Murayama (D.), Ito (T.), & Inukai (K.). **Immunological studies on the Potato virus diseases. VIII. Studies on the serum protein.**—*Mem. Fac. Agric. Hokkaido Univ.*, **3**, 2, pp. 128–135, 2 pl., 1959. [Engl. summ.]

Further studies [cf. **33**, 313] on potato virus X.

Hansen (H. P.). **Tobacco mosaic virus carried in Potato tubers.**—Abs. in *Amer. Potato J.*, **36**, 8, p. 294, 1959.

All plants of clone 67 A in a collection of 'wild' potato spp. from S. America were stunted with somewhat rigid leaves and diffuse yellowing. A virus regularly found in the tubers was identified as a tobacco mosaic virus str. [cf. **20**, 606]. In Samsun tobacco symptoms varied, but there was a tendency to form a ring-like mosaic or necrotic rings and line patterns, unusual for tobacco mosaic. Sometimes there was internal stem necrosis, reminiscent of the Rotterdam B str., from which the present str. differed in not being soil-borne [cf. **16**, 129]. Sap inoculation to leaves of some commercial potato vars. produced local lesions, sometimes followed by more or less systemic mosaic and necrotic lesions.

Harrison (B. D.). **The pattern of field infection of Potato by the Beet ringspot strain of Tomato black-ring, a soil-borne virus.**—*Ann. appl. Biol.*, **47**, 3, pp. 557–564, 1959.

At the Scottish hort. Res. Inst., Invergowrie, the potential importance of the beet ring spot str. of tomato black ring virus [**39**, 222] was assessed by growing stocks of Kerr's Pink potato for 1 yr. on infested land and thereafter on uninfested. The incidence of infection (assayed on *Chenopodium amaranticolor*) in 2 stocks was 39 and 8%, respectively, in the 1st yr. on uninfested land, and 29 and 5% after 2 yr. In the 1st yr. the virus was usually confined to the roots, but a few plants bore black rings and spots on the leaves. In the 2nd yr. 20–55% of the plants from tubers from symptomless mother plants were infected: many had leaf necrosis, others had stunted shoots, with cupped, distorted leaves, and some were symptomless, though systemically infected. In the 3rd and 4th yr. most of the progeny from plants with symptoms, or symptomless but systemically infected, contained the virus: infected plants were either stunted and distorted or symptomless. No characteristic internal symptoms were noted in tubers from infected plants.

Infection reduced the wt. of tubers from plants with severe necrotic spotting, but not the yield of plants with less severe necrosis. The number of tubers plant was decreased by 15 and wt. by 20% in symptomless systemically infected plants, and by 20 and 30% in stunted plants. Although tomato black ring virus tends to be self-eliminating in potatoes, its danger to potato stocks, in which it can decrease yields without producing symptoms, is clear.

Lihnell (D.). **Studies on the etiology of spraing.**—Abs. in *Amer. Potato J.*, **36**, 8, pp. 299–300, 1959.

Reference is made to work on potato spraing disease at the Swedish State Plant Protection Inst., already noticed [**37**, 571: **38**, 331]. In practically all potato plots where spraing tubers were used as seed 'spraing mosaic', similar to potato stem mottle described by Rozendaal [**28**, 85], developed. There was a clear positive correlation between mosaic symptoms on the haulms and the occurrence of secondary spraing in the tubers. In 2 experiments the tubers of potato plants top-grafted with spraing scions had internal brown necrosis not typical of [primary] spraing, but within the range of variation of true secondary spraing symptoms [**39**, 221].

Niederhauser (J. S.), Buck (R. W.), & Akeley (R. V.). **Erendira, a new blight-resistant Potato variety for the highlands of Central Mexico.**

Niederhauser (J. S.) & Cervantes (J.). **Anita, Bertita, and Conchita, three new blight-resistant Potato varieties developed in Central Mexico.**—Abs. in *Amer. Potato J.*, **36**, 8, pp. 300, 301, 1959.

Erendira is a bushy, semi-erect, medium late var., developed by the Office of

Special Studies, Mex. Dept Agric. for growing as an unsprayed crop in Central Mexico, has multigenic resistance to blight [*Phytophthora infestans*: **39,** 188]. Pinkish streaks in the white flesh of the white-skinned tubers may make it commercially unattractive.

The other 3 vars., suitable for cultivation during the rainy season in C. Mexico also have multigenic resistance to blight. All produce high yields in unsprayed fields where other commercial vars. yielded nothing.

Andrén (F.) & Olofsson (B.). **Besprutningsförsök mot Potatisbladmögel 1958.** [Spraying experiments against Potato blight 1958.] —*Växtskyddsnotiser, Stockh.*, **23**, 1, pp. 10–13, 2 fig., 1959.

In general, the carbamates, i.e. zineb (represented by De Zäta 78 and ewozin, both used at 2·5 kg. ha.), maneb (De Em 22, also at 2·5), and zineb + Cu oxychloride (nultox 58, 6 kg.), proved somewhat superior to the other preparations tested both against blight [*Phytophthora infestans*: **38**, 27] and as stimulants to increased production [**38**, 765]. Maneb in particular is recommended for extended application.

Мукнін (Е. Х.). Действие ионизирующей радиации на устойчивость клубней Картофеля к грибам **Fusarium sp.** [The effect of ionizing radiation on the resistance of Potato tubers to the fungus *Fusarium* sp.] —*Proc. Lenin Acad. agric. Sci.*, **24**, 9, pp. 14–17, 1 fig., 3 graphs, 1959.

This information has been noticed [**39**, 188].

Kranz (J.). **Über die Ausbreitung der Phoma-Fäule der Kartoffelknolle in Abhängigkeit von Umweltfaktoren.** [On the spread of *Phoma* rot in Potato tubers in relation to environmental factors.]—*Phytopath. Z.*, **36**, 2, pp. 101–110, 3 graphs, 1959. [Engl. summ.]

In further studies [**39**, 190] at the Inst. für Pflanzenkrankheiten, Univ. Bonn, the further development of *Phoma* rot was investigated in tubers of 6 German potato vars. stored from Jan. at 2–6° C. Strains of *P. foveata* from Germany and Scotland were grown for 14 days in the dark at 21° on 2% biomalt agar, then inoculum (5 mm. sq.) was placed in cuts in the tubers, closed with paraffin; the tubers were kept in open containers in temp., light, and humidity chambers. In almost all vars. diminishing temp. favoured the development of the rot, which increased with increasing length of infection, higher temp. inhibiting the rot more rapidly. Air R.H. and light did not greatly affect rot development, though pycnidia were formed more quickly and abundantly in light. With increasing age the tubers became increasingly susceptible at 10°, 16°, and 21°, whereas at 4° they seemed to become more resistant towards the spring. Spread in storage through wounds is regarded as possible though not very important.

Hildebrand (E. M.). **Preliminary observations on the internal cork virus complex in the Sweetpotato.** *Plant Dis. Reptr.*, **43**, 10, pp. 1070–1072, 1959.

At Beltsville, Md, Scarlet O'Hara morning glory [*Ipomoea bona-nox* × *I. hederacea*] was used to detect internal cork virus [**39**, 190] in numerous collections of symptom-bearing sweet potato leaves from 7 States, using the modified 'squeeze-rub' rapid transmission technique [**35**, 632]; 3 strains were distinguished: str. 1, with an incubation period of 5–8 days in the indicator, induced dwarfing, rugosity, and vein-clearing followed by masking; str. 2, 8–12 days incubation with moderate to severe vein-banding, then masking; and str. 3, 10–15 days or more with mild vein-banding, netting, and masking.

Blazquez (C. H.). **Host-parasite relations of the fungus Dothidella ulei P. Henn on the Hevea Rubber tree.** —*Diss. Abstr.*, **20**, 3, p. 835, 1959.

At the Univ. Fla, U.S.A., the growth of *D. ulei* [**37**, 307] was observed on rubber

leaves at various stages of development. A black exudate was produced on stage 1 leaves, whether susceptible or resistant. Conidia germinating on resistant leaves produced abundant appressoria, but there were few on susceptible; penetration of the susceptible was usually direct. A yellow material was detected in resistant tissue soon after penetration, and also in lesions in susceptible tissue. In cleared highly resistant leaves and paraffin-embedded sections of the same no sporulation, stromatic mycelium, or fructifications were seen.

Best growth in culture was obtained on media containing *i*-inositol+1-glutamic acid [loc. cit.]. Media containing water extracts of *H. brasiliensis* clones also gave good growth, but there was none with 6-month-old leaf water extract, or on another prepared from 6 month old leaves of F 4542 (*H. benthamiana*).

Compound 1 was present as a yellow spot on chromatograms of all extracts from young leaves, while 3 other compounds were found only in extracts from young susceptible leaves. Compound 5, present in chromatograms of extracts from healthy, but not diseased, leaves, turned brown on treatment with silver acetone.

Proceedings of the Second International Scientific Tobacco Congress, June, 1958. —825 pp., 3 col. pl., 106 fig., 1 map, 65 graphs, [? 1959].

This Congress was held in Brussels, on the 8–15 June, 1958. In the section dealing with virus diseases T. H. Thung presents conclusions (pp. 59–62, Engl.; 63–66, Fr.) drawn from replies from 50 colleagues in 32 countries to a questionnaire on the distribution of viruses on tobacco; while some are widespread throughout the world, others (listed) are restricted to limited areas, either by temp. or by the climatic requirements of their vectors. The findings for 18 virus diseases are tabulated. Tomato spotted wilt [map 8] is reported on tobacco in Bulgaria and Czechoslovakia; tobacco leaf curl from Morocco and Switzerland [map 147]; and tobacco ringspot from Austria, Bulgaria, Cuba, Yugoslavia, Czechoslovakia, Greece, Morocco, Spain, and N. Zealand [map 144].

G. Roland (pp. 67–80, Fr.) draws a further conclusion from answers to the same questionnaire, namely that the diagnosis of tobacco viroses at a number of Institutes is often quite empirical, and may be based simply on symptoms without regard to the environmental conditions. Since accurate diagnosis demands considerable facilities it is suggested that a central diagnostic laboratory be set up under international auspices. A list of laboratories able to supply specific anti-virus serums to tobacco stations on request would be useful. Some examples are given, illustrating the general thesis that the control of tobacco virus diseases should be based on the natural mode of transmission of the viruses.

O. Aubert (pp. 83–85, Fr.) gives a brief account of tobacco vein necrosis virus (potato virus Y str.) [**39**, 126] of which the potato crop is an important reservoir of infection; selection of resistant tobacco vars. is at present the sole method of control.

D. Bailov & Mme M. Andréïtcheva (pp. 86–92, Fr.) made tests at the Bulgarian Acad. Sci. to demonstrate that the spotting (termed aladza or verderame [**36**, 356]) which occurs during curing is due to certain curing conditions and not to infection by tobacco mosaic virus.

O. Bode (pp. 93–96, Fr.) reports from the agric. Virus Res. Inst., Brunswick, Germany, that the tobacco vein necrosis str. of potato virus Y [cf. above] exists in the German Federal Republic [**37**, 421] in masked infections in potatoes. *Nicotiana glauca*, *N. raimondii*, and *N. tomentosiformis* are resistant. Tobacco line 230, developed by the British American Tobacco Co., shows considerable resistance, plants under glass in winter, inoculated with infectious sap diluted 1/50, developing no symptoms within 3 weeks and giving no virus reaction; only after 6 weeks did a mild browning occur on the midribs of old leaves, and the virus was detected by reinoculation.

P. Cantillon (pp. 97–101, Fr.) states that when, in 1957, 450 tobacco vars. were raised in 2 plots at the Station de Recherches de l'État pour l'Amélioration des Plantes de Grande Culture, Gembloux, Belgium, 1 of which had previously been under oats and the other under beet, the incidence and severity of all virus diseases and the number of vars. attacked was noticeably greater following beet. The most serious were tobacco vein necrosis, mosaic, and its speckled mosaic str. The Virginia vars. Mont-Calme Jaune and Jaune Resistant (SOTA, Switzerland), the Burley vars. Ky 16 (Ky agric. Exp. Sta.), Gran Reddito, and Rhinau were apparently immune, as were the cigar vars. Havana 322, 307, 211, and 142 (Wisc. agric. Exp. Sta.) [**38**, 226], and the Italian Resistente 142. Also deserving of mention were Resistente 945, and the German selections N.F.T., Havana II, Havana III, Goudie, and Geudertheimer.

G. W. Cochran & T. H. Thung (pp. 102–104, Engl.) working at the Lab. Virology, Wageningen, detected a 3–4 fold increase in the amount of recoverable tobacco mosaic virus in leaves of White Burley tobacco and *N. glutinosa* during the 1st hr. after inoculation at 30° C. and then the level remained constant for 2 hr. Possible reasons are discussed. Some atypical lesions occurred on *N. glutinosa*, which either spread more rapidly than usual in over 50% of the inoculated leaves, or there was a very delayed reaction in most of the leaves [cf. **37**, 738].

P. R. Desjardins (pp. 105–110, Eng.) states that in experiments at the Univ. Calif., Riverside, the conc. of 'active' potato calico virus (alfalfa [lucerne] mosaic virus str.) in inoculated leaves of Turkish tobacco [cf. **37**, 416] and *N. glutinosa* increased to a max. (the time depending on season and locality) and then fell rapidly to a very low level. Many particles, though inactive by the 36th day, retained the physical properties permitting their isolation by centrifugation.

W. Endemann (pp. 111–114, Fr.) tested 147 tobacco vars. at the Tobacco Res. Inst., Dresden, Germany; 20% were tolerant of vein-necrosis (str. of potato virus Y) [cf. above], most of them being related to Geudertheimer, Paraguay, or Comstock.

A. H. Gold (pp. 115–116, Engl.), in a general paper, discusses some ecological considerations affecting virus research, particularly in relation to soil viruses.

Z. Hidaka (pp. 116–117, Engl., Fr.) reports studies at the Hatano Tobacco Exp. Sta., Japan, of the multiplication of tobacco mosaic virus in full grown leaves of Xanthi tobacco inoculated by carborundum abrasion, as evidenced by assay of leaf disks of *N. glutinosa* [cf. **37**, 597]. There was no multiplication in the 1st 20 hr., after which (up to 100 hr.) it could be represented by a sigmoidal curve with 3 steps, each of about 20 hr. duration.

The work of H. Itier & C. Izzard (pp. 118–121, Fr.) has been noticed [**39**, 125].

In work at the Tobacco Res. Inst., Forchheim, Germany, G. Koelle (pp. 122–124, Fr.) found Havana IIC to be resistant to vein necrosis [cf. above] and FO (Forchheimer Ogrodowi) extremely susceptible; resistance is genetically determined [cf. **38**, 422].

V. N. Kosmodem'jansky (pp. 125–131, Engl.) of the Tobacco Inst., Krasnodar, reviews breeding work on tobacco virus diseases in the U.S.S.R.; mosaic, cucumber mosaic, and tomato spotted wilt are the most important. The resistance of Ambalema to mosaic is determined by a recessive gene; the var. is not resistant to cucumber mosaic. Certain selections of eastern tobaccos (Trapezond 61, Alma Atinsky 287) are resistant to tobacco mosaic virus and to oidium [*Erysiphe cichoracearum*]. The dominant resistance of *N. glutinosa* to tobacco mosaic has been used to obtain on a commercial scale F_1 seed which combines 100% resistance with the benefits of heterosis. The hybrid at present used is the immune A-A-315 × Trapezond 2736.

L. Rave (pp. 132–137, Fr.) of the Haus Ritter, Schierbrok Oldenburg, Germany,

in a critical discussion of methods of breeding for virus resistance, refers to the selection of mutants, intervarietal crosses, and interspecific crosses. Virginia tobacco vars. are mentioned as being particularly susceptible to the vein necrosis str. of virus Y. Resistant tobacco vars. exist, but are of low quality. No resistance was found in the progeny of seeds treated with X-rays.

Mlle G. Sommereyns (pp. 138–143, Fr.), at the Lab. Phytovirology, Gembloux, Belgium, finds that of various methods tested Schramm's (*Z. Naturforschung*, 7b, p. 513, 1952) high speed centrifugation technique yields good samples of potato virus Y from infected tobacco material. Starch and paper chromatography also gave good results.

At the Lab. Flower Bulb Res., Lisse, Netherlands, D. H. M. Van Slogteren (pp. 144–149, Engl.) has established serological relationships between 2 of Noordam's isolates from chrysanthemum [**32**, 559] and chrysanthemum aspermy virus: Ouchterlony's method (*Ark. Kemi Min. Geol.* **26** B, 14, 1949) was used, agar being poured into a glass ring glued to the bottom of a Petri dish at its centre and into other rings placed symmetrically round it. A hole is made in the agar at the centre of each ring, the antiserum put into the centre one, and sap from plants infected with the various virus strains into the others [cf. **39,** 239]. A serological relationship between 2 strains is evidenced by fusion of the precipitation lines between adjacent holes and the centre hole, indicating antigen-antibody combinations common to both strains. Patterns of precipitation lines were also obtained by heterologous diffusion of chrysanthemum aspermy virus antiserum against the type strain of cucumber mosaic virus, a 'yellow' strain, and a strain isolated by Rubio Huertos from *Zinnia*.

J. Voelk (pp. 150–155, Fr.), Fed. biol. Sta., Brunswick, Germany, established that the Lü strain of potato virus Y is transmissible by *Myzus persicae* from tobacco to tobacco even when the acquisition and infection times are limited to a few sec.; opt. transmission was in 12–15 min. Transmission was better to the 1st 5 of 10 plants than to the remainder. *M. persicae* is the most effective vector of this str., but it is also transmitted by *Doralis* [*Aphis*] *rhamni*, *D.* [*A.*] *fabae*, *D.* [*A.*] *frangulae*, *Macrosiphum solanifolii* [*M. euphorbiae*], and *Neomyzus circumflexus* [*Aulacorthum circumflexum*], and by direct and indirect contact of tobacco leaves.

H. Wan (pp. 156–158, Engl.), Tobacco Res. Inst., Taiwan, states that it has proved possible to introduce *glutinosa* type mosaic resistance into cultivated tobacco vars. for commercial use in Taiwan. Thus far 17 selections have been obtained from 3 backcrosses with Vamorr 48 to Hicks, Vesta 64, Virginia Gold, and Bottom Special. In a large-scale field test in 1957–58 infection in the resistant strains was 3·02%, 1·58% of these dying from systemic infection before harvest, while non-resistant vars. were almost completely infected. There were numerous necrotic spots on the leaves of the resistant strains, indicating that they were equally exposed to infection. Field sanitation is important even when resistant strains are grown.

Matsui (C.). **Pathological cytology of Tobacco leaf infected with Tobacco mosaic virus, III.**—*J. biophys. biochem. Cytol.*, **4** (ii), 6, p. 831, 1 pl., 1958.

At the Fac. Agric., Nagoya Univ., Aichiken, Japan, the intracellular localization of virus particles was studied by electron microscopy in tobacco (var. Xanthi) leaf sections [**38**, 162] slightly infected with the common str. The chloroplasts in affected cells were composed of regularly organized lamellae and grana embedded in a granular matrix as in healthy material of tobacco and some other plants. The fibrous masses of virus rod particles, generally disposed in a parallel direction, were readily recognizable within the cytoplasm and near the surface of the chloroplasts but never within them. Hence it is inferred that disorganization of the chloroplasts is a secondary development not directly related to virus formation in the plastids.

Wu (J.-H.). **Studies on local lesion formation by Tobacco mosaic virus.**—*Diss. Abstr.*, **20**, 3, p. 865, 1959.

At Washington Univ. the various infectious materials derived from tobacco mosaic virus (TMV) and its mutants were found to exhibit characteristic variations in infectivity on leaves from bean plants [*Phaseolus vulgaris*: cf. **37**, 312] of different ages. Common type TMV is infectious to all such plants but the nucleic acid is highly sensitive to the age of the test plant, the number of lesions being strongly affected by only 2 days difference in age. Holmes' 1933 B4 mutant was more sensitive than the common str., closely resembling common str. nucleic acid. The nucleic acid of the B4 strain was even more sensitive than B 4 nucleoprotein. The nucleic acid of TMV nucleoprotein initiated lesions earlier and produced the max. number more quickly than whole virus, which suggests that the infectivity of TMV nucleoprotein involves a release of its nucleic acid to an infection site. Reconstituted nucleoprotein produced lesions considerably later than standard TMV nucleoprotein, though a simple mixture of nucleic acid and protein did not. These observations indicate that when the nucleic acid and protein are reconstituted a specific complex is formed which behaves quite differently from the starting materials.

Kurtzman (R. H.). **Part I. Inhibition and stimulation of Tobacco mosaic virus by purines. Part II. Healthy host enzymes for screening antiviral agents.**—*Diss. Abstr.*, **20**, 2, pp. 478–479, 1959.

Of 14 purines tested at Univ. Wis. in cultures of White Burley tobacco tissue with crown gall [*Agrobacterium tumefaciens*: **37**, 184], previously infected with TMV, 6-chloropurine, purine, and 8-chloroxanthine inhibited the virus (as tested by local lesion assay after 1, 3, and 6 weeks' incubation) about as effectively as 8-azaguanine and thiouracil [cf. **38**, 279]. Concs. of 10–100 mg./l. were necessary, but growth of the host tissue was inhibited at these levels.

Caffeine strongly stimulated the virus at low concs., 1 g./l. enhancing virus production by 80%. The 1st compound demonstrated to inhibit virus without inhibiting the host was 6-methylpurine, which was antiviral at 0·01 mg./l. and gave 40% inhibition of local lesions at 0·1 mg. l. At least 0·25 mg./l. was necessary to damage the host tissue. With whole plants 10 mg./l. were necessary to delay the appearance of symptoms for 7 days.

Enzymes from healthy tobacco leaves were used for screening potential antivirus agents, those active in the initial incorporation of purine bases into nucleic acids being investigated. Of 16 compounds screened with inosine and guanosine phosphorylase, 4 were placed by tissue culture tests outside the class predicted for them by the enzymatic tests. Of these, 3 had less value than had been expected from the enzymatic appraisal, but 1 was very active.

Thomson (R.) & McLeod (A. G.). **Verticillium wilt of Tobacco. I. A new disease of Tobacco caused by Verticillium dahliae Kleb. II. Field and glasshouse trials to determine resistance of varieties and species to Verticillium dahliae Kleb.**—*N.Z.J. agric. Res.*, **2**, 4, pp. 785–791, 2 fig., 1 map; pp. 792–796, 1959.

An unusual condition observed at Motueka in Feb. 1944, which has since rendered economic production impracticable in some areas, appears to be the 1st record of *Verticillium* wilt [**35**, 927: **37**, 7] as a major disease of tobacco. The outstanding symptom is the orange colour of the wilted leaves. Wilting does not appear until after flowering, and starts in a few leaves, being followed by the interveinal area turning bright orange; later the tissue dies and turns brown, leaving an orange border between the living and dead tissue. Symptoms generally occur first on a few lower leaves, but eventually there is a complete foliage breakdown. In cross-section the vascular tissue of the leaf midrib shows a light brown discoloration, but roots show no symptoms. Symptoms are the most severe when heavy rain or

irrigation follows a dry spell. At present the disease covers an area of approx. 70 acres, of which 30 are a total loss to tobacco production. New centres of infection seem to originate from the movement of infected soil and plant debris by water. Plots 25 × 15 ft. were treated with chloropicrin, applied with a hand injector at 4 ml./sq. ft., without a water seal, or with methyl bromide, released under a plastic cover at 1 lb./100 sq. ft. Both reduced the amount of wilt practically to nil, but their use is uneconomic except for eliminating small centres of infection. With either compound, costs for material alone would be over £160 acre, apart from application.

Field resistance trials at the D.S.I.R. Tobacco Res. Sta., Moteuka, described in the 2nd paper gave no results because symptoms were never expressed until flowering, often for some considerable time after, and material selected and bagged early in the season was liable to develop symptoms later. Also the progeny of plants surviving when the disease was not severe would develop severe symptoms the following year. Use of heavily infected soil in the glasshouse showed no improvement over field methods and neither permitted the handling of many plants. At present attempts are being made to develop a glasshouse method to measure resistance in seedlings.

Gäumann (E.), Kern (H.), & Obrist (W.). **Der Einfluß einiger Welketoxine auf den Wasserhaushalt abegeschnittener Tomatensprosse.** [The influence of some wilt toxins on the water economy of cut Tomato shoots.]—*Phytopath. Z.*, **36**, 2, pp. 111–121, 5 graphs, 1959. [Engl. summ.]

In further studies [**37**, 761] at the Eidg. Techn. Hochschule, Zürich, lycomarasmic acid (from *Fusarium lycopersici*), baccatin (*Gibberella baccata*) [**29**, 423], culmomarasmin (*F. culmorum*), and skyrin (*Endothia parasitica*) under constant conditions affected both the uptake of water into tomato shoots and transpiration, each inducing a different type of syndrome.

Binder (E.) & Hutchinson (M. T.). **Further studies concerning the effect of the root-knot nematode Meloidogyne incognita acrita on the susceptibility of the Chesapeake Tomato to Fusarium wilt.**—*Plant Dis. Reptr.* **43**, 9, pp. 972–978, 2 fig., 1959. [23 ref.]

At Rutgers Univ., New Brunswick, N.J., a population of *M. incognita acrita*, relatively non-pathogenic to field grown cantaloupe, was used in attempts to break down the resistance of the Chesapeake tomato to *F. oxysporum* f. [*F. bulbigenum* var.] *lycopersici*. Despite considerable gall formation, resistance was not impaired, either under conditions of normal nutrition or with K deficiency; in fact, a highly significant increase in root growth was induced by nematode infection under normal nutrition. These results are in marked contrast with previous studies (cf. Jenkins & Coursen, *Plant Dis. Reptr*, **41**, pp. 183–186, 1957) and suggest that the ability of nematodes to break resistance is related to their pathogenicity; this depends on the race of nematode sp. and the quantity of initial nematode inoculum.

Hille (M.). **Ein einfaches Verfahren zur Infektion der Tomate mit Synchytrium endobioticum (Schilb.) Perc.** [A simple process for the infection of Tomato with *S. endobioticum*.]—*Phytopath. Z.*, **36**, 4, pp. 394–405, 6 fig., 1 graph, 1959. [Engl. summ.]

At the Inst. für Botanik, Brunswick, Germany, tomato seedlings pricked out in slits in sheets of spongy plastic were infected by *S. endobioticum* [cf. **15**, 601] when immersed in water together with fresh tumours of potato wart for 24 hr. at 8° C. and then washed and transferred to nutrient solution in the greenhouse. In 3 days clear flecks on the cotyledons, rolling of the margin, and curving of the stem develop. Brown sporangia are visible in 2–3 weeks. With this method it is possible to test

experimental plants of any spp. for susceptibility to this fungus or other *S.* spp. and to study the environmental factors that affect the swarming of zoospores and their penetration into the new host. The age of the seedlings did not affect the experiments. As infection media tap water and Van Der Elst nutrient solutions diluted to $\frac{1}{10}$ or $\frac{1}{100}$ were just as suitable as distilled water. Infections were produced at 4–20° C. with no noticeable opt. Infection occurred within 30 min. of dipping the wart tumours in the medium. The number of infections was greater in the 1st 2·5 hr. than in the following 14 hr.

Nayudu (M. V.). **Studies on the bacterial spot of Tomato.** —*Diss. Abstr.*, **20**, 3, p. 841, 1959.

At Univ. Wis. *Xanthomonas vesicatoria* grew well on a basal medium containing vitamin-free casein hydrolysate or yeast extract in potato extract + 1% sucrose and nutrient broth. Aspartic and glutamic acids and glutamine supported moderate growth. The 4 phases of the disease recognized were: water-soaked lesions < 2 mm. diam.: lesions turned brown; the leaves became chlorotic and exhibited epinasty; and finally they dried out and became brown and leathery. The decrease in susceptibility of leaves as they grew older [cf. **37**, 511] was correlated with a decrease in total and soluble N and an increase in polyphenol.

The disease developed most rapidly at 24° C., the temp. most favourable to good vegetative growth of the host. The amino-acid conc. was higher in plants grown under warm conditions than under cool: glutamic and aspartic acids, however, occurred in relative abundance in both. Very low and very high levels of N, P, or K markedly retarded both plant growth and the disease. It is suggested that the bacterium is exacting in its nutritional requirements, probably requiring a certain balance of amino acids for good growth and successful pathogenesis.

Mikhaĭlenko (M. A.). О микоризе Томатов в условиях Воронежской области. (Краткое сообщ). [On Tomato mycorrhiza in the conditions of the Voronezh region. (Brief report).] –Изв. Воронежск. гос. пед. Ин-та [*Izv. Voronezhsk. gos. ped. In-ta*]. *1958*, 24, pp. 277–282, 1958. [Abs. in *Referat. Zh. Biol.*, *1959*, 19, p. 118, 1959.]

Mycorrhiza formation was observed on 9 of 23 tomato vars. In the vars. Bizon and Earliana cultivated in the conditions of the Voronezh region, mycorrhizal development started during budding, reached a max. at flowering, and then declined until fruit maturation when lysis took place. It was most abundant in tomato plants following grass and cabbage. The yield of the different vars. was directly proportional to the degree of mycorrhizal development.

Alexander (L. J.) & Campbell (Ruth E.). **Concentration of Tobacco mosaic virus in Tomato plants throughout the growing season of two glasshouse crops and a field crop.** *Ohio J. Sci.*, **59**, 5, pp. 271–280, 4 graphs, 1959.

At Ohio agric. Exp. Sta., Wooster, tobacco mosaic virus [cf. **29**, 387; **38**, 487] infection (mechanical) reduced the number of tomato fruits set/cluster, but usually the reduced sets did not persist beyond the 2nd or 3rd cluster after infection. Virus conc. and recovery, either in growth or fruit set, were apparently unrelated both for Ohio W-R Globe and Strain A Globe in the glasshouse and Stokesdale in the field. The virus conc. in plants inoculated 10 weeks after planting out in the glasshouse was lower than in plants inoculated during transplanting and this tendency was greater in the lower parts of the plant.

Klyushnik (P. I.). О грибных болезнях Дуба. [On fungus diseases of Oak.]— Лес. Хоз. [*Les. Khoz.*], **12**, 11, pp. 50–52, 6 figs., 1959.

In a survey of plantations of different ages in zones of forest steppe (Khar'kovskaya

region) and steppe (Nikolaevskaya region), during which a total of 1.592 trees in 5 test areas were examined, the following fungi were found: *Clithris* [*Colpoma*] *quercina* [**38**, 630] which was identified on 98% of the trees, *Coryneum umbonatum*, *Vuilleminia comedens*, *Diatrype stigma*, *Fusicoccum quercus*, *Caudospora* [*Diaporthe*] *taleola*, *Diatrypella quercina*, *Fusicoccum advenum*, *Botryosphaeria melanops* (the ascal state of *Fusicoccum*), *Fomes robustus*, and *Polyporus dryophilus*. Control measures are discussed, and the necessity for more effective controls stressed.

Ciferri (R.). **Ricerche sulle virosi delle piante arboree effettuate in Pavia-Voghera.** [Researches on the viroses of arboreal plants carried out in Pavia-Voghera.]—*Notiz. Malatt. Piante* 49–50 (N.S. 28–29), pp. 215–227, 5 pl., 1959.

Ciferri (R.). **Recenti risultati nelle ricerche sulle virosi delle piante arboree da frutto.** [Recent results of researches on viroses of fruit trees.]—*Ric. sci.*, **29**, 9, pp. 1880–1884, 1959. [Fr., Engl., Germ. summ.]

The investigations detailed in the 1st paper have been noticed [**38**, 356].

Notes are given on transmission tests with 23 viruses of fruit trees in Italy. A new virus complex of ash is reported. The presence of a virus mosaic disease of poplar is confirmed. Studies were begun of virus diseases of rose [**38**, 523] and wistaria [cf. **37**, 170].

Geard (I. D.). **Diseases of Walnuts and Mulberries.**—*Tasm. J. Agric.*, **30**, 3, pp. 252–255, 4 fig., 1959.

These trees are generally grown in gardens in Tasmania and the diseases include bacterial blight (*Pseudomonas mori*), canker (*Gibberella* [*baccata* var.] *moricola* [cf. **36**, 600], and leaf spot (*Septogloeum mori*) [cf. **29**, 517] on mulberry, and bacterial blight (*Xanthomonas juglandis*) [cf. **37**, 609] of walnut. A short description of each disease is followed by control measures. Bordeaux spraying for the blights and for the leaf spot and phytosanitation in every case.

Davidson (R. W.), Lombard (Frances F.), & Campbell (W. A.). **A white heart rot of Fraxinus caused by Fomes johnsonianus (Murr.) Lowe.**—*Plant Dis. Reptr*, **43**, 11, pp. 1148–1149, 1 fig., 1959.

In studies at Beltsville, Md, of fungi causing decay on living trees *F. johnsonianus* (recently regarded by Lowe [**37**, 339] as *F. densus*) was identified as the cause of a white laminated rot in ash, sometimes starting as a white mottled rot, in Louisiana and Virginia.

Popushoĭ (I. S.). Распространение голландскоĭ болезни в насаждениях Молдавии. [Dissemination of the Dutch disease in plantations in Moldavia.]—Лес. Хоз. [*Les. Khoz.*], **12**, 10, p. 50, 1959.

In plantations on 16 Forest Industry Establishments Dutch elm disease [*Ceratocystis ulmi*: cf. **39**, 53] was found to be the basic cause of the dying of elms. The spread, in the author's opinion, is due to failure to take requisite measures, and regular felling of diseased trees is advocated. In Moldavia the most susceptible species is *Ulmus foliaciae*. Considerably less susceptible are *U. scabra*, *U. suberosa*, and *U. laevis*. The small-leafed *U. pumila* and *U. pinato-ramosa* are considered resistant. On several Forest Industry Establishments, however, and in plantations in Kishinev and Bel'tsy infection on *U. pumila* extended to the root system. *U. pinnato-ramosa*, grown at present only in urban plantations, is recommended for trial in forest and forest-steppe areas.

Bakshi (B. K.) & Boyce (J. S.). **Polyporus shoreae root rot on Sal.**—*Indian For.*, **85**, 11, pp. 656–658, 1 fig., 1959.

During a survey of sal [*Shorea robusta*] in 1959 [cf. **38**, 230] new areas of disease were

noted in N. Bengal and Assam. Between 10 and 20% of the trees were dead or dying. Although the fungus is widespread in the forests it is of economic importance only in forests of the wet type. The present high incidence of the disease is attributable in large measure to the fire protection legislation in force up to 1916, which caused the forests to become moist and develop heavy undergrowth. It is thought that controlled burning in established wet sal forests would reduce soil moisture and keep the incidence of the disease below danger level.

Korbonskaya (Mme Y. I.). Микологическая флора Арчевников центральной части Туркестанского хребта. [The mycological flora of the Juniper forests of the central part of the Turkistan range.]—*ex* The Juniper forests of the central part of the Turkistan range. Труд. бот. Инст., Акад. Наук Таджик. ССР [*Trud. bot. Inst., Akad. Nauk Tajik. S.S.R.*], **73**, pp. 233–257, 1 fig., 1958. [6 pp. ref.]

Fungi (155 spp. and forms) were collected from the ground flora and trees during 2 expeditions (1948 and 1953–54). The collections were studied at the Dept of Cryptogamic Plants, Inst. Bot., Academy of Sciences of the U.S.S.R. and are grouped under: Phycomycetes (3 spp.), Ascomycetes (48 spp. and forms), Basidiomycetes (64 spp.), and Fungi imperfecti (40 spp.). The main disease of growing junipers (*Juniperus turkestanica* and *J. semiglobosa*) was brown and white timber rot, which was prevalent on both S. and N. slopes of the range. Mixed grass-juniper stands were comparatively free. The dissemination and opt. development periods of *Fusarium* infection of juniper seedlings was also studied. Those in mixed grass suffered least.

Most prevalent were the rust fungi (50 spp. in 6 genera), being found mostly on the ground flora. Typical of the juniper forests of the Turkistan range is *Gymnosporangium turkestanicum* (teleutospores on *J. turkestanica* and *J. semiglobosa*, aecidia on *Sorbus tianschanica*). *Inonotus* [*Polyporus*] *heinrichii* was found on a rotted stump of *J. turkestanica*, and *Gloeophyllum abietinum* [*Polystictus abietinus*] on a brown-rotted stump of *J. semiglobosa*. The latter fungus is not known from Central Asia and is seldom found in the Soviet Union.

Newhook (F. J.). **The association of Phytophthora spp. with mortality of Pinus radiata and other conifers. I. Symptoms and epidemiology in shelterbelts.**

Sutherland (C. F.), Newhook (F. J.), & Levy (J.). **II. Influence of soil drainage on disease.**—*N.Z.J. agric. Res.*, **2**, 4, pp. 808–843, 8 fig., 4 diag., 1 graph; pp. 844–858, 1959.

A serious disease has been killing large numbers of *P. radiata*, *P. muricata*, *Cupressus macrocarpa*, *Chamaecyparis lawsoniana*, and other conifers in various parts of N.Z. Trees die within 1–3 months or defoliate heavily and remain in a short tufted-needle condition for some years. Primary symptoms seem to be solely death of the feeding rootlets. Isolations from soil, using apple fruit 'traps', yielded *Phytophthora* spp. with great frequency; *P. cinnamomi* [**37**, 381] and *P. cactorum* were those most commonly recovered. *P. citricola*, *P. syringae*, *P. cryptogea*, and *Pythium* spp. were also isolated from soil below diseased trees. Pathogenicity has been demonstrated so far for the first two. There was a highly significant correlation between the presence of *Phytophthora* spp. and disease symptoms in shelterbelts, and between the severity of external symptoms and abundance of the pathogen in the soil. Some originally healthy looking shelterbelts growing in soil heavily infested by *P.* spp. developed severe symptoms later, after exceptionally wet periods. The disease was present both on some well drained soils and on heavy soils with poor drainage. Grid surveys showed that *P.* spp. were rarely to be found in adjacent fields but were heavily concentrated in the rootlet region of trees.

P. cinnamomi, which was isolated from depths up to 2 ft., appears to die out or is more difficult to isolate within 1–2 yr. after death of all pine roots. *Pinus radiata* seedlings and saplings up to 4–5 yr. are highly susceptible, then the trees are resistant until 20–30 yr. old.

Continual heavy rain more than poor drainage favours *Phytophthora* infection. Epidemics occurred only when there was abnormally early re-wetting of the soil in autumn, with wet conditions continuing until spring, though prior summer drought may sometimes contribute to epidemic development by causing fragmentation of heavy soils. *Pinus radiata* has a high capacity for rootlet regeneration following severe damage from drought, flooding, or *Phytophthora* infection, the last 2 together killing roots far more rapidly than flooding alone. *P.* spp. increase rootlet mortality to many times that normally occurring in winter.

Symptom expression depends on how far the balance between transpiration demand and root absorption capacity is destroyed. Full-crowned trees with a large transpiring surface soon reach a state of permanent wilt and die. Those less severely attacked, with transpiring surfaces reduced by heavy defoliation, can tolerate severe rootlet damage and may appear resistant.

The main difference between the disease of pines in N.Z. and little-leaf disease of *Pinus echinata*, also involving *Phytophthora cinnamomi*, in forests of south-eastern U.S.A. [**35**, 731] is one of rapidity of symptom development, due to different transpiration demands of full- and reduced-crowned trees. The 2 diseases are considered to be basically the same.

P. spp. have also been isolated from several commercial *Pinus radiata* forests in the N. Island of N.Z. The author suggests, as a practical solution to the problem, changing to other spp. that may be locally suitable and resistant to *Phytophthora*.

In the exceptionally wet 1956 season death and defoliation of *P. radiata*, *Cupressus macrocarpa*, and others conifers (dealt with in the 2nd paper) occurred on better as well as poorer drained soils. Data from 1,570 *P. radiata* and 863 *C. macrocarpa* stands led to the following conclusions: while soil drainage strongly influenced severity of symptoms, it had no major influence on the extent of disease within individual stands except on very poorly drained soils; although *P. radiata* is initially much more susceptible its recovery rate is very much higher than that of *C. macrocarpa* on all soil types, because of root regeneration and more rapid shedding of needles or branchlets as a result of water shortage; susceptibility of *P. radiata* increased and the recovery rate of infected trees decreased with increasingly poor soil drainage, but susceptibility of *C. macrocarpa* was greatest at both extremes of soil drainage and recovery rate uniformly fairly low.

Martynov (E. N.). Снежное шютте препятствует возобновлению вырубок. [Snow blight hinders the replanting of clearings.]—Лес. Хоз. [*Les. Khoz.*], **12**, 10, pp. 49–50, 2 fig., 1959.

In 1958 counts made by the Tikhvin Forest Industry Establishment, Leningrad region, of 9,000–37,000 pine saplings/ha. in clearings of different ages in lichen heath and moss heath type forests showed that both small and large saplings up to 3 m. and over are liable to infection by *Phacidium infestans* [cf. **28**, 495; **35**, 855]. Max. needle cast occurred in the smallest saplings and decreased with height; at 1–2 m. it was found only in new clearings. This regularity is connected with the depth of snow cover and the upward spread of the fungus, which mostly does not exceed 60–80 cm. In new clearings infection is slight, but reaches 67% in 10 yr.-old clearings, after which it again falls sharply. In some dry pine forest clearings infection of saplings may reach 70%. The disease is a serious menace also for the subsequent replanting of clearings. In 7 and 10 yr.-old clearings, however, young pines were found to be less susceptible than saplings. Infection percentage here in the 1st and 2nd height groups was 3–4 times less than in the saplings. In older

clearings the relative infection of the subsequent replanting increases as the saplings grow in height. In an 18 yr.-old clearing it exceeded that of saplings of all height groups. Spraying saplings and seedlings in the late autumn before snow with 1% Bordeaux mixture or lime-sulphur is advocated. With especially valuable material in nurseries sprayer ORP-A is advocated, and for continuous clearings, spraying from the air.

Nighswander (J. E.). **The epidemiology of Jack Pine-Oak gall rust in Wisconsin.** —*Diss. Abstr.*, **20**, 2, p. 450, 1959.

Eastern gall rust [*Cronartium quercuum*: cf. **23**, 198] has in some years limited the cultivation of Jack pine [*Pinus banksiana*] in both nurseries and forest stands in parts of Wis. The amount of new infection on pine varied greatly in different years and different areas.

In studies at Univ. Wis. aecidiospores were produced early in May after day-time temps. had been over 20° C. for about a week. They germinated over the range 8–28° (opt. 20°). Uredospores developed on young oak leaves 6–11 days after infection at 16–24° and germinated within the range 4–28° (opt. 20°). Uredosori continued to produce viable spores for nearly 2 weeks. Teleutospores were produced on oak leaves at 16–28°, remaining viable for up to 46 days and germinating at 12–24° in the presence of free water. After 9 hr. at 20° the teleutospores cast basidiospores, which gave germ-tubes on pine decoction agar but only secondary sporidia on other media. Normal germ-tubes formed at 12–24° not less than 4 hr. after the spores were cast.

Initial infection by aecidiospores on pine required at least 10 hr. of saturated air, free water, and a temp. between 8–28°. Late spring frosts and dry weather during spore dispersal limited spread. Secondary spread by uredospores was limited by dry weather and the decreasing susceptibility of oak leaves with age. Susceptible leaves on sprouts from recently cut oak stumps tended to prolong the spread of uredospores.

Infection of pine was possible only when there were viable teleutospores on oak, in central Wis. usually from early June to early July, if secondary spread by uredospores did not occur; if it did occur, the teleutospores were usually present for about 2 weeks longer. A period of 13 hr. of 100% humidity following a measurable rainfall was necessary for the production and germination of basidiospores. These conditions occurred infrequently in central Wis., and in some years not at all.

Of various fungicides tested, zineb and ferbam at 2 lb./acre gave the best control of the disease on seedlings in the nursery.

Rishbeth (J.). **Stump protection against Fomes annosus. I. Treatment with creosote. II. Treatment with substances other than creosote.**—*Ann. appl. Biol.*, **47**, 3, pp. 519–528, 1 pl.; pp. 529–541, 1 pl., 1959.

Further studies at Univ. Cambridge and in East Anglia [**37**, 119; **39**, 59 *et passim*] showed that creosoting pine stumps immediately after felling commonly prevents the entry of *F. annosus* and other basidiomycete colonizers through the cut surface [cf. **39**, 131]. *Ceratocystis* spp. and *Ophionectria cylindrospora* often enter, but grow slowly. Light creosote applications frequently failed to exclude basidiomycetes, as did delayed application, especially when resin flow from the cut surface was rapid. In 1 experiment creosoting controlled air-borne infection of large stumps by *F. annosus*. In forest tests results after 2 months indicated that a gasworks creosote (B.P. 190–300° C.) gave satisfactory protection, though a tar/creosote mixture did not. Creosote, however, retards colonization of stumps, and those treated tend to live longer than the untreated, increasing the risk of *F. annosus* becoming dominant in stumps which already have root infection.

The 2nd paper shows that various substances, when added to the stump surface

in conc. solution immediately after felling, strongly influence the course of fungal colonization. N applications, particularly ammonium sulphamate, favoured *Trichoderma viride* and *Penicillium* spp., which tended to suppress surface colonization by *F. annosus*. Certain other applications were at first toxic to stump fungi, but rapid leaching permitted the growth of various moulds which tended to suppress *F. annosus* and other primary basidiomycete colonizers. These substances include urea, which encouraged the growth of *O. cylindrospora*, and disodium octaborate, which favoured *Botrytis cinerea*. In 5 experiments in 1957–8 no infection by *F. annosus* was recorded in 30 stumps treated with the octaborate and heavily inoculated a few days later. Stump treatment with urea also gave excellent control of natural, air-borne infection by basidiomycetes and these materials appear highly promising for control of *F. annosus*. Stumps generally die more rapidly after such treatments than after creosoting. The swift colonization of treated stumps by saprophytes is an advantage where application is incomplete or the stump is later damaged, but the effectiveness of treatments in preventing a major spread of *F. annosus* from roots already infected by it appears to depend to some extent on which species becomes dominant.

Shemakhanova (Mme N. M.). Изучение микотрофии древесных пород методом чистых культур. [Study of tree mycotrophy by pure culture methods.]—*Bull. Acad. Sci. U.R.S.S., 1959*, 5, pp. 675–686, 4 fig., 1959. [Engl. summ.]

The method used at the Inst. Microbiol., Acad. Sci. U.S.S.R., Moscow, is derived from the pure culture techniques of Melin [**16**, 49], Hatch [**14**, 187], and Doak [**13**, 458] (*Amer. Midl. Nat.*, **54**, pp. 443–451, 1955) for the production and identification of tree mycorrhiza. For seed sterilization 5% Ca hypochlorite is advocated. Vermiculite heated at 900° is a better substratum than quartz sand. For coniferous and other short trunk plants the Melin chamber is recommended, but with an increased capacity (750–500 ml.). The Melin nutrient medium was used with the addition of vitamin B_1 (100 mg. l. medium). Two seedlings were found to develop well in a single flask, reaching a height of 7·5 cm., total dry wt. 50 mg. A detailed description is given of the author's own chamber, which is recommended for vigorous foliage plants, in which the aerial part is exposed to the air.

Ivanova (Mme R. N.). К вопросу о микоризе Кедра сибирского. [Concerning the mycorrhiza of Siberian Cedar.]—Изв. биол.-геогр. н.-и. Ин-та, Иркутск. Ун. [*Izv. biol.-geogr. n.-i. In-ta, Irkutsk. Un.*], **17**, 1–4, pp. 57–67, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 19, p. 118, 1959.]

The mycorrhiza of *Pinus cembra* var. *sibirica* is of the ectoendotrophic type; seedlings without it die or are very retarded. Copious mycorrhiza make for strong growth with good lateral development. In all, 7 forms were observed, 3 ectotrophic and 4 ectoendotrophic. The downy-felt ectotrophic and the forked ectoendotrophic types are very common. Mycorrhiza were present only in the forest litter layer.

Zycha (H.). **Zur Frage der Infektion beim Lärchenkrebs.** [Concerning infection by Larch canker.]—*Phytopath. Z.*, **37**, 1, pp. 61–74, 7 fig., 1959.

From further studies at the Inst. für Forstpflanzenkrankheiten, Hann. Münden, Germany [**35**, 561], the author concludes that *Dasyscypha* [*Trichoscyphella*] *willkommii* [**38**, 714, 715] usually penetrates the bark in the autumn via the scars of fallen needles. As the short shoots bear many needles they are particularly susceptible to infection, and cankers most frequently develop after the 1st needle cast at the end of the 2nd year of growth. Possibly spring infections occur also in bud areas, the fungus remaining latent [loc. cit.] in a small area during the summer and spreading into the bark in the autumn. When weather conditions during leaf fall favour the discharge and germination of spores, while delaying the healing of needle

scars, the infection is encouraged. The fungus thus spreads in the bark until at the beginning of the next growth period the formation of barrier tissue stops its advance. This 1st zone of attack seldom completely encircles the shoot. The healthy part is able, in the next growth period, to form a new annual ring which may more or less occlude the wound. The degree of damage in the 1st yr. determines the course of the disease. If more than $\frac{1}{2}$ the circumference of the shoot is damaged it will almost certainly die from the point of attack upwards in the spring, during budding. The incompletely formed needles dry up. If infection occurs near the base of the twig the canker will sooner or later reach to the next shoot below, where, as a result of the greater thickness and more favourable nutritional conditions, a typical canker will develop, soon encircling the branch and killing it.

Cowling (E. B.). **Comparative biochemistry of the decay of Sweetgum sapwood by white and brown rot fungi.** *Diss. Abstr.*, **20**, 3, pp. 868-869, 1959.

Solubility analyses at Univ. Wis., of the sapwood of *Liquidambar styraciflua* rotted by *Polyporus* [*Polystictus*] *versicolor* (white rot) and *Poria monticola* (brown) [cf. **38**, 108], expressed as percentages of original sound wood, indicated little change as white rot progressed, though there was an increase in the early stages of brown rot and a decrease later. With white rot the major constituents of the wood were utilized at rates approx. proportional to the amounts present in sound wood, while with brown rot it was primarily the carbohydrates which were utilized, each at a different rate during the various stages of decay. With white rot there was a gradual reduction in the av. degree of polymerization of holocellulose, whereas with brown rot the reduction was rapid at first, then gradual. Brown rot led to a rapid initial decrease of hygroscopicity, followed by a more gradual reduction.

X-ray diffraction analyses indicated a small decrease in the proportion of crystalline material in white rot, and a more pronounced decrease with brown rot, after 10% wt. loss. With white rot there was a general thinning and increase in porosity of the cell walls, dissolution of pit pairs, and the presence of fungal bore holes, which were the primary evidence of cell wall deterioration with brown rot.

The differences in the rate of depolymerization of the wood carbohydrates by the 2 fungi were considered to account for the differences in strength, pulping properties, solubility, dimensional stability, and surface appearance of the 2 types of wood.

Diller (J. D.) & Koch (E. J.). **Weight losses of 40 wood species exposed to Poria incrassata and Merulius lacrymans.** *For. Prod. J.*, **9**, 9, pp. 298-302, 1 fig., 3 graphs, 1959.

In test plots of the agric. Res. Service, Beltsville, Md, the 2 fungi were grown successfully for a 2-yr. period on wedges of wood under polyethylene sheet and mounds of forest leaves in a wooded area at Beltsville. The only maintenance required was an occasional watering during the hottest, driest periods and prevention of insect attack. *Merulius* caused more wt. loss than *Poria*. There appears to be some interaction between wood spp. and the 2 fungi, however. There was some loss in all 23 U.S.-grown wood spp. by the end of the 2 yr. For the 7 wood spp. for which 200 wedges each of heartwood, heart-sapwood, and sapwood were tested, wt. loss in the heartwood was considerably less than in the others, with the exception of eastern hemlock [*Tsuga canadensis*]. Those with the least wt. loss (less than 10%) were the heartwoods of eastern red cedar [*Juniperus virginiana*] and redwood [*Sequoia sempervirens*], while heartwoods of Atlantic white cedar [*Chamaecyparis thyoides*], western red cedar [*Thuja plicata*], and bald cypress [*Taxodium distichum*] had less than 10% wt. loss in the 1st yr., but considerably more in the 2nd. Of 16 U.S.-grown spp. exposed in less than 200 plots, those with the least wt. loss were Osage-orange [*Maclura pomifera*], Japanese chestnut, and American smoke tree

[*Cotinus americanus*]. White oak and black walnut suffered less wt. loss from *Poria* than from *Merulius*. Douglas fir [*Pseudotsuga menziesii*] and western hemlock [*Tsuga heterophylla*] had the most wt. loss of the 16 spp. In a limited study of 17 tropical woods, 5 spp. had less than 2% wt. loss. There was no connexion between sp. gr. and wt. loss, broadleaved spp. having as much as coniferous.

Demikhovs'ka (Mme A. A.). Деякі дані про домові гриби Української РСР. [Some data on the house fungi of the Ukrainian S.S.R.]—*J. Microbiol., Kiev*, **21**, 4, pp. 19–24, 1959. [Russ. summ.]

The results presented are based on 3,860 laboratory analyses of infected wood samples. It was established that the fungi occurring on wooden dwellings and public buildings in the Ukraine in 1953–56 belonged to 38 spp. (listed). *Merulius lacrymans* (26%) [cf. **38**, 432], *Poria vaporaria* (9·8%), *Coniophora cerebella* [*C. puteana*: **38**, 634] (26·1%), *Lenzites saepiaria* (16·6%), *Paxillus acheruntius* [*P. panuoides*] (4·4%), and *Poria* sp. (11·9%) were the most frequently encountered and were found in nearly all the regions studied. The remaining 32 spp. (5·2%) were mainly forest and warehouse fungi, seldom attacking dwelling houses. The major part (51·3%) of timber deterioration was due to fungi alone, 37·4% to fungi and wood-destroying beetles, and only 11·3% to beetles alone. *C. cerebella*, *L. saepiaria*, and *Poria* sp. infected wood in conjunction with beetles 2–2·5 times more freqently than *M. lacrymans*, *P. vaporaria*, or *Paxillus panuoides*.

Lund (A. E.). **Subterranean termites and fungi. Mutualism or environmental association.**—*For. Prod. J.*, **9**, 9, pp. 320–321, 3 fig., 1959.

Studies at the laboratory of the Koppers Co., Verona Res. Center, Verona, Pa, showed that southern yellow pine sapwood blocks, uninfected by fungi, were attacked by eastern subterranean termites within 24 hr., thus demonstrating that previous infection by fungi is not essential for termite attack.

Ellwood (E. L.) & Ecklund (B. A.). **Bacterial attack of Pine logs in pond storage.**—*For. Prod. J.*, **9**, 9, pp. 283–292, 7 fig., 1959.

Investigations by the Univ. Calif. Forest Products Lab., Richmond, disclosed that extreme porosity developed in the sapwood of immersed parts of ponderosa and sugar pine logs when they were stored in virtually stagnant ponds. Porosity varied with time, developing most rapidly in summer when water temp. was 90° F. No excessive porosity occurred in logs from the same source decked under water sprays for a similar period. High porosity is detrimental in that it causes heavy over-adsorption of water-repellent preservatives. Brown stain in ponderosa pine is associated with organisms causing porosity. The resulting depletion of the contents of ray parenchyma and its eventual disintegration does not apparently reduce the strength of the wood.

Bacillus polymyxa, which will attack hemicellulose and pectin, was tentatively identified as the causative agent, but it is probable that a variety of other related spp., such as *B. cereus*, are also involved. That causative bacteria were present in small numbers in apparently sound, freshly felled logs was indicated by the isolation from a freshly felled tree of a pure culture which caused excessive porosity in apparently sound wood in laboratory jar tests; by the fact that the development of porosity in sterilized sapwood was always considerably slower than in non-sterilized when exposed to infected water; and also apparently sound, freshly felled sapwood eventually developed excessive porosity in sterilized water under laboratory conditions, but sterilized wood in sterilized water did not.

The most satisfactory treatment, though with some disadvantages, for the prevention of porosity for considerable periods was acidification to pH 2·5 with sulphuric acid. Logs can also be stored in salt water or decked under water sprays.

FURZE (J. E.). **The chemistry and engineering of timber preservation.**—*S. Afr. industr. Chem.*, **13**, 4, pp. 80–86, 7 fig., 1 diag., 1959.

A useful survey of up-to-date information, with special reference to S. African conditions, presented under the main headings of general structure of timber, impregnation procedures and techniques, requirements of a timber preservative, operation of impregnation equipment, engineering of impregnation equipment, and major difficulties of the impregnation process.

MCQUIRE (A. J.). **Limitations imposed by some water-borne preservatives on the soil block test method for timber.**—*Nature, Lond.*, **184**, 4696, p. 1430, 1959.

A preliminary report is given of investigations at Forest Res. Inst., Rotorua, N.Z., into the part played in wt. loss in wood blocks [cf. **38**, 168] by the loss of soluble salts by diffusion from certain water-borne preservatives. This affects the precise value of the threshold conc. of the preservative because of extraneous wt. losses from sound blocks. During the tests an increase in block moisture content occurred over a wide range of soil moistures, absorbed mostly from the atmosphere above the soil. As the different preservatives induce different moisture retentions, a variety of micro-environments ensues, and results are not strictly comparable. On occasion, moisture content may be high enough to limit fungal growth, owing to lack of aeration, and salts may be lost by diffusion, causing unknown wt. losses.

Lengthening the life of mine timbers with organotin preservatives.—*Tin Uses*, **48**, pp. 14–16, 1 fig., 1959.

In a trial organized by the Tin Res. Inst., Greenford, Middx., timbers [unspecified] which had been left in a hot aqueous solution of triethyltin hydroxide [cf. **38**, 664] overnight and removed when cold, were installed in damp situations in 3 mines, alongside untreated timbers. At the final inspections after $2\frac{1}{2}$ or $3\frac{1}{2}$ yr. rotting was severe in the controls but practically absent from the treated timbers.

Triethyltin hydroxide, unpleasant to prepare and handle, is not available commercially, but tributyltin oxide is; it is soluble in organic solvents, including paraffin, kerosene, and fuel oil, and deserves trial.

CHENULU (V. V.). **Studies on host range, bioassay and properties of Turnip mosaic virus (Marmor brassicae H.) from Horseradish.**—*Diss. Abstr.*, **20**, 1, p. 41, 1959.

A single-lesion isolate of turnip mosaic virus from a leaf of a tobacco plant inoculated with leaf extract from a clone of commercial horse-radish was tested on 35 plant spp. at Univ. Ill., using *Chenopodium amaranticolor* as assay plant in preference to tobacco by reason of the shorter incubation period and greater stability in the amount of infection under fluctuations of temp. Twenty spp. remained without symptoms or assayable virus; 9, including *C. album* and *Gomphrena globosa*, developed local lesions; and 9, including *Nicotiana glutinosa*, developed systemic symptoms. No plant with assayable virus remained symptomless. When extracts from 72 horse-radish accessions were screened only 5 were negative. The greatest number of local lesions in *C. amaranticolor* was obtained when the inoculum was at pH 8 and the conc. of the phosphate buffer 0·2 M. Incubation at 30·5° or 18° C. gave the same level of infection but incubation was more prolonged at 18°.

MATTHEWS (R. E. F.). **Turnip yellow mosaic virus nucleoprotein particles with differing biological and physical properties.**—*Nature, Lond.*, **184**, 4685, pp. 530–531, 1 fig., 1959.

At the Plant Diseases Div., Auckland, N.Z., turnip yellow mosaic virus [cf. **37**, 612; **39**, 134] preparations isolated from Chinese cabbage by the ammonium sulphate procedure [cf. **28**, 261] yielded a faster sedimenting band, B_2, containing $\frac{1}{5}$ $\frac{1}{20}$ as much material as a slower band, B_1. Infectivity of the B_2 fraction from once-sedimented bands on half leaves of Chinese cabbage was 6–25% of that of B_1.

In preparations obtained by differential centrifugation sedimented with caesium chloride there was a 3rd, more slowly moving band, B_0, containing less ribonucleic acid than B_1 and of substantially lower infectivity. All 3 fractions gave similar virus precipitation end points (based on optical density of the sol. at 260 mμ) when tested with an antiserum against unfractionated virus. The fractions described are not considered to be artefacts. The possibility of separating infectious and non-infectious particles may prove useful in studies of inactivation of the virus by various agents.

Csitkovics (A.) & Magassy (L.). **Cukorrépanemesítésünk helyzete és további lehetőségei.** [Present situation of Sugar Beet breeding in Hungary and its further outlook.]—*Növénytermelés*, **7**, 1, pp. 95–106, 1958. [162 ref.]

This survey of vars. and their performance includes mention of resistance to diseases, such as *Cercospora* [*beticola*: **35**, 258], curly top virus, and Beta virus 4 [beet yellows virus], and will be found especially valuable for the abundant bibliography.

Bennett (C. W.) & McFarlane (J. S.). **Effect of the virus yellows on Sugar Beet seed production.**—*Plant Dis. Reptr*, **43**, 11, pp. 1188–1190, 1 fig., 1959.

At Salinas, Calif., in 4 field tests conducted in 1956–58 [cf. **35**, 140], reduction in seed yield following infection by beet yellows virus in Mar. was 43·4–70·2%, compared with 18·6–21·1% from May infection. Seed plants inoculated in Mar., before bolting began, were significantly more reduced in size than those inoculated in May, but there was no evidence that the virus affected seed viability.

Marx (Ruth). **Über Virulenzunterschiede bei Rübenvergilbungsviren aus Süd- und Westdeutschland.** [Differences in virulence of Sugar Beet yellows viruses from S. and W. Germany.]—*Phytopath. Z.*, **36**, 4, pp. 419–423, 1959. [Engl. summ.]

Comparative greenhouse tests with sugar beet yellows [**35**, 570] and mosaic [**35**, 803] viruses and complexes of the two at the Zweigstelle Rosenhof, Max Planck Inst. für Züchtungsforschung, Ladenburg-Neckar, showed that isolates from S. Germany were less virulent and caused a less severe inhibition of growth, a slower and less evident development of symptoms, a lesser reduction of leaf number and leaf area, and a smaller increase of reducing sugars than those from W. Germany. Also there were differences in growth after bolting in the 2nd yr. The S. German strains were also less inhibitory in *Chenopodium foliosum*; when these plants were infected early total necrosis resulted, but when later, plants were killed only by the viruses from W. Germany.

Ghillini (C. A.). **Studio comparativo preliminare di diciotto ceppi di Sclerotium rolfsii del 'marciume radicale' delle Bietole.** [A preliminary comparative study of 18 strains of *S. rolfsii* causing root rot of Beets.]—*Notiz. Malatt. Piante* 49–50 (N.S. 28–29), pp. 229–242, 6 pl., 1959. [Engl. summ. 25 ref.]

Comparative morphological studies of 18 strains of *S. rolfsii* [cf. **33**, 331, *et passim*] from different localities in Italy are described. The perfect state was not obtained and no taxonomic conclusions have as yet been reached.

Dean (L. L.) & Wilson (V. E.). **A new strain of common Bean mosaic in Idaho.**—*Plant Dis. Reptr*, **43**, 10, pp. 1108–1110, 1959.

At Idaho agric. Exp. Sta., Twin Falls, a previously unreported strain of bean common mosaic virus [**37**, 62] caused severe infection of Great Northern U1–123 beans (*Phaseolus vulgaris*) in 1954. In greenhouse inoculations the virus infected all vars. which carried recessive resistance to the type strain of common mosaic virus; those with dominant resistance to the type were resistant or susceptible. The new strain was seed-borne in susceptible vars.

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